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CONTENTS

1. *Islamic architecture of the Deccan*

MATE M. S. 1

2. *On the Accentuation of the Vocative, Rtāvrdhau in RV 1.2.8.*

BALASUBRAHMANYAM M. D. 92

3. *The Potter's technique in Proto historic Ahar*

DEO S. B. 105

4. *An early history of Flax in India*

GULATI A. N. 112

5. *Ethnic affinities of Rajputs of Pauri Garhwal (Uttar Pradesh)*

GULATI R. K. 118

6. *A Pedigree of Partial Albinism*

MALHOTRA K. C. 154

7. *Two Stone Age Sites on the River Chambal, Rajasthan*

MISHRA V. N. and NAGAR M. 156

8. *An Interesting Vishnu Image from Baijnath (Almora)*

NAUTIYAL K. P. 170

9. *Kriyāsamāsas in Marathi*

VALE R. N. 175

10. *Book Reviews* :

(a) Alexander K. C. 200

(b) Mate M. S. 201

OFFICE OF THE DIRECTOR OF ARCHAEOLOGY
26 AUG 1969
GOVT. OF MADRAS, MADRAS

ISLAMIC ARCHITECTURE OF THE DECCAN

by
M. S. MATE

I. INTRODUCTION

The present study covers a span of nearly three hundred years i.e. from the establishment of the Bahmani rule in the Deccan to the end of Moslem hegemony in the region. The region covered is broadly known as the Deccan. It comprises all the tract of land south of the river Narmada and north of the river Krishna, excluding the territories governed by the Faruquis of Khandesh. To the east and west, the hilly ranges and the coastal strips do not come into the picture as much as the central plateau does. Not all the architectural monuments are taken note of; only those erected by the Bahmanis and their political and cultural successors, the five Sultanates of the Deccan, have been examined. These are, naturally, concentrated largely in and around the capital cities of the various rulers.

These monuments have been surveyed and described by various students. As such the subject of the paper is not a fresh one. It does not touch an untrodden field. The Archaeological Survey of India have surveyed and recorded the architecture of Bijapur and its environs — the capital of the Adil Shahis. The results have been published by COUSENS in his monumental work *'Bijapur and its architectural remains'*. A great deal of work about medieval Moslem monuments has been done by the Archaeological Department of the former Nizam State. The *Annual Reports* of that Department record information regarding most of the structures of the period. These *Reports* attain great importance due to the fact that a large part of the Bahmani Kingdom was within the boundaries of the Hyderabad State. A very significant phase of Islamic architecture of the area, viz. the one seen at Bidar has received special attention from G. YAZDANI. Journals like *'Islamic Culture'* and the *'Journal of the Hyderabad Archaeological Society'* have taken notice of several typical monuments. These were primarily efforts at data-collec-

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This monograph is the result of a survey carried out by the author with the aid of a Research Grant given by the University of Poona. The drawings and photographs included in this work are prepared by Shri H. J. Kumthekar, Architectural Draughtsman in the Deccan College.

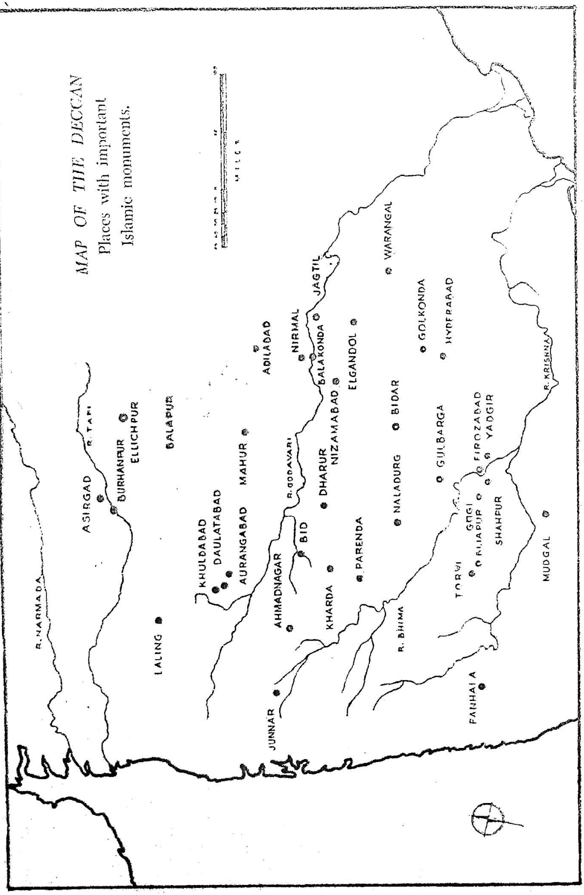
MAP OF THE DECCAN
Places with important
Islamic monuments.
MILES
R. NARMADA
ASIRGAD
R. TAPI
BURHANPUR
ELLICHPUR
BALAPUR
LALING
KHULDABAD
DAULATABAD
AURANGABAD
MAHUR
R. GODAVARI
DHARUR
NIZAMABAD
ADILABAD
NIRMAL
BALAKONDA
JAGTIL
ELGANDOL
WARANGAL
GOLKONDA
HYDERABAD
BIDAR
GULBARGA
FIROZABAD
YADGIR
NALADURG
PARENDA
BID
AHMADNAGAR
KHARDA
JUNNAR
R. BHIMA
TORVI
BIJAPUR
GOGI
SHAHPUR
MUDGAL
R. KRISHNA
PANHALA

Fig. 1

tion. All available material was carefully gathered and recorded. However, it would be idle to suppose that authorities like COUSENS, MARSHALL, YAZDANI would remain satisfied with a sort of recording operation. They have devoted equal or more attention to the interpretative aspect as well. And it is the line of argumentation emerging from the studies of these and other recognized students that is towed by later students.

The question naturally arises, whether after all the aforesaid work has been done, there was any necessity to undertake a further probe. The author had an opportunity of studying, in an entirely different context, these works and the monuments under discussion, and he came to the conclusion that something still more can be said.

In the first place, each place and each monument and structure received individual attention in most of the previous works. This was only proper since they had to be recorded as scientific data. But such a treatment unwittingly leads to a great defect. It distorts the perspective greatly. The monument, its individuality, its independent character, receive an emphasis out of all proportion. This, in its turn, results in creating an impression that the structures concerned represent an art tradition that is constantly blossoming forth into a rich flora of varying colours and shapes. A slight touch of poetic language, a reference here and there to the splendours of the courts, completes this process of distortion. There emerges, ultimately, a picture of architectural achievements forceful in expression, varied in content and informed by vivid imagination and originality. An image, no doubt dazzling, but far removed from reality. The basic unity and underlying uniformity of forms, shapes and methods is lost sight of. It is necessary to penetrate beyond these slightly deceiving appearances and reach the bare forms. Hence an investigation into the tectonic activity of the entire period taking into account its various local manifestations was a task worth undertaking.

Secondly, the generalities born of these distortions needed corrections. The course of the evolution of Deccani building art, as generally presented today falls into three main phases. The cradle of this style was the Pathan architecture of Delhi. Monuments at Gulburga illustrate this phase. The next phase shows a dominant influence of West Asian and Persian styles as seen at Bidar. The last and slightly decadent era represents greater affinity towards the local Hindu art traditions. These general conclusions could also be put to a fresh test. The enquiry would become more precise if some questions are formulated at this stage. These are :

(a) What was the nature of the basic principles governing Islamic architectural planning ?

(b) How far and in which direction did these principles undergo changes in the period under discussion ?

To make the solution of these problems easier some further questions may be put :

(c) If there are any material changes, what are they ?

(d) What are the novel elements introduced and what is their source ?

These are the problems posed and attempt is made in the following pages to find a solution to them. Design development has, therefore, received greater attention in this study. This also means lesser emphasis on going after affinities and influences. The style had, when it came to the Deccani, an individuality of its own. It had its own development. It is a generic growth not unlike the growth of natural organisms. It would be interesting and illuminating to trace the progress of this phenomenon. This is a shift in emphasis. No one denies the importance of the role of cultural contacts, of imitations and borrowing of ideas. But it should also be remembered that each form, is capable of germinating a newer, advanced one, with or without imitation of foreign models.

Following is an analysis of this process.

II. HISTORICAL NOTE

The course of Islamic rule in the Deccan is quite long and the pattern it cuts is chequered. Justice cannot be done to it in a small space of a few pages. The following lines are intended to make the reader familiar with the background of the discussion that follows regarding the tectonic activities of these rulers.

The hilly ranges of the Satpuda and the Vindhya and the very thick forests in between and around them protected for a long time, the northern frontiers of the tract of land known as the Deccan. This barrier was formidable enough to prevent the incursions of Moslem invaders for nearly three centuries i.e. nearly upto the end of the thirteenth century. At that time, on this side of the barrier no single force was visible on the political horizon that would enjoy undisputed supremacy. Several Hindu princes controlled kingdoms, large and small. Out of these, the Yadavas of Devagiri and the Kakatiyas of Warangal were the foremost. There is abundant evidence to show that the times immediately preceding the Moslem invasion witnessed a remarkable efflorescence of the culture of the people. This happened inspite of the constant struggles these princes undertook against each other. A very faint glimpse of these developments might be taken here so as to be able to understand what profound change Islamic ideas brought about. In religion, in philosophy, in literature, in art, new forces came into play.[1] New ideas found expression through novel ways. Perhaps the most significant ones were in the religious field. The Nath Panth received a fresh vigour due to the activities of Gahininath. Shri Chakradhara founded the Mahanubhav panth, while Basav established the Lingayat sect. The former is a form of Krishna worship while the latter was a militant Saivite sect. Another movement that gained vast popularity and acquired great influence in this region was the Varkari sampradaya. Based on the cult of Bhakti, with the Vitthal of Pandharpur as its centre, this movement has great hold on the masses even today. Literature concerning religion and philosophy was produced in abundance. The followers of Chakradhara were responsible for a large volume of writings. The famous commentary on Bhagvadgita by Jnaneshvara falls in the same period. In other directions too stalwarts arose. Astronomers like Bhattacharya, authorities on music like Sharangadev, the scholar-minister of the Yadavas, viz. Hemadri, all flourished in these two centuries. A distinct style of temple architec-

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[1] For fuller information see : BHAVE V. K., *Musalmanpurva Maharashtra*, Vol. 1, pp. 16-17, 120-125, 276-285. MAJUMDAR R. C. and PUSALKAR A. D., *The History and Culture of Indian People*, Vol. 5, 352-357.

ture was developed under the patronage of the Yadavas and for that reason might be designated the Yadava style.[2] In short alround progress followed in the wake of material prosperity achieved under the Yadavas and the Kakatiyas. The Moslem rulers did not descend into a cultural vacuum, but whatever existed was certainly foreign to them — as foreign as anything can be. It is very interesting to note that the culture that the Moslem courts developed in the Deccan was and continued to be alien in its content and inspiration. The deeply rooted native character and tradition could influence it after a very long lapse of time. This is nowhere better evident that in the field of building activity.

The Deccan was rudely shaken out of its prosperity and progress by the bold invasions of a capable and ambitious general of the Delhi Sultans, Ala-ud-din Khalji, who later on ascended that throne himself. Although there was an earlier intercourse of the western coast of India with the Moslems, it was chiefly of a commercial nature. The first conquest was, as mentioned, by Ala-ud-din Khalji. Apart from visions of political supremacy, the Deccan's wealth was too tempting for such an enterprising adventurer. Ala-ud-din and Kafur, his Malik Naib or lieutenant in the Deccan, had wound up the Yadava rule and enfeebled the Kakatiyas considerably, and when Sultan Muhammad Tughluq came to power, Moslem foothold was quite firmly established in the Deccan. So firmly was it established, indeed, and so much was the Sultan impressed by the importance of these newly acquired provinces that he transferred his capital from Delhi to Daulatabad, the former Devgiri. This was, as it were, a signal that the centre of gravity of the Empire had shifted itself. As things unfolded, however, the domination of the Deccan turned out to be only an episode in the eventful history of the Delhi Sultanate.

The mass migrations that Muhammad Tughluq had ordered, from Delhi to Daulatabad, introduced a Moslem element into the population of the Deccan. In addition, numerous Moslem officers and other ranks were brought into the Deccan as the nucleus around which Delhi was to build its administrative machine. Muhammad, in one of those acts of indiscretion for which he was well-known, managed to antagonise the whole class of officials known as Centurions. He wrecked his vengeance upon the Centurions in no uncertain fashion and thus completely destroyed the very foundations of the machinery that was built up to uphold and assert the Sultan's authority in the province.

The Centurions, once successful in repelling the royal forces, set about consolidating their gains. Two leaders were chosen in quick succession. The first to be elected was Nasir-ud-din Shah, an old and ease-

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[2] See : COUSENS H., *Mediaeval Temples of the Dakhan*, ASI — 48, Calcutta, 1931. NAIK A. V., *Archaeology of the Deccan*, Thesis accepted for the Degree of Ph.D., not yet fully published. Deccan College, 1947.

loving man, who enjoyed the confidence of his class. In 1347, that is, after nearly three years' reign, he voluntarily stepped down and a more forceful and capable man came to the fore. He ascended the throne in 1347 as Abul-Muzaffar Ala-ud-din Shah, also known as Hasan Gangu Bahmani.[3] He first set his own house in order. The kingdom was divided into four provinces and an administrative machinery was brought into existence, probably as efficient as any in a medieval state. He made Gulburga his capital in preference to Daulatabad, although the latter continued to maintain its importance as the headquarters of one of the four administrative divisions. His efforts in the direction of fresh conquests were considerable. His son and successor Muhammad I was a diligent administrator and a brave soldier. His name is also associated with a good deal of activity in the cultural field and the Jammi mosque at Gulburga was his handiwork. The next ruler of note was Muhammad II, who 'was a man of peace, devoted to literature and poetry and his reign was undisturbed by foreign wars'.[4] Another ruler in the line, Taj-ud-din Firuz Shah, is noteworthy on two counts. He prosecuted the war with Vijayanagar with great success. He caused to be built the famous pleasure resort, Firuzabad on the Bhima. Ahmed Vali or the Saint, the brother and successor to Firuz, transferred his capital from Gulburga to Bidar. Muhammad III, a prince of great energy and considerable military ability, may be considered the last king of his line. For although five of his descendants succeeded him, they were, as the *Cambridge History* puts it, "nothing more than state-prisoners in the hands of ambitious and unscrupulous ministers".[5]

Throughout their long rule amounting to more than one and three-quarters of a century, the Bahmanis entertained foreign talent with open arms. "Sultan Firoz Shah every year despatched vessels from the ports of Goa and Cheul to bring him the manufactures and curious productions of all quarters; but particularly to invite persons celebrated for their talents if any, who, he would frequently observe, should be regarded as the choicest possessions of all countries."[6] A major part of this consisted of soldiers, administrators and ambitious adventurers. But in the field of cultural activities also the number and the influence of these foreigners was great. It was practically predominant. Poets, artists, architects, religious preachers were imported from various countries, the chief source being 'of course' Persia. This phenomenon, as the authorities on the subject would tell us, imparted a character to the Bahmani rule in the Deccan that made it stand out as against that of the other

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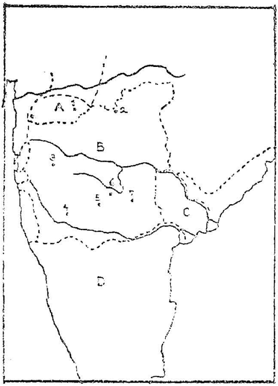
3 Narrative based on : *Cambridge History of India*, Vol. 3, Chapters XV to XVIII and SCOTT J., *Ferishta's History of the Dekkan*, Vol. 1.

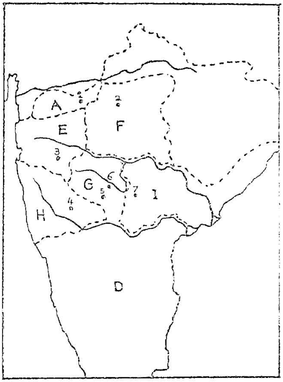
4 *CHI*, 3,385.

5 *Ibid.* 422.

6 SCOTT J., *op.cit.*, 73.

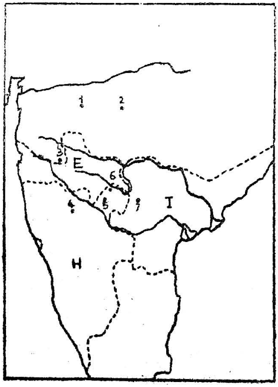


1398



1525

1695



MAP OF THE DECCAN

SHOWING THE POLITICAL DIVISIONS

during the Fifteenth and Sixteenth Centuries

Index

States		*Cities*	
A	Khandesh	1	Thalner
B	Bahmani	2	Ellichpur
C	Telingana	3	Ahmadnagar
D	Vijayanagar	4	Bijapur
E	Ahmadnagar	5	Gulburga
F	Berar	6	Bidar
G	Bidar	7	Golconda
H	Bijapur		
I	Golconda		

Fig. 2

Moslem dynasties in India. This need for a continuous import of talent seems a bit surprising, especially in the light of the splendid accomplishments of the native population, just alluded to, unless perhaps it is taken for granted that everything indigenous was inferior and worthless and everything emanating from Persia was superior *ipso facto*. Or else the simple but rather inconvenient explanation of religious bias is to be accepted. Be it as it may, the fact remains that to-date authorities elect to attribute the various qualities of the Deccani culture to sources foreign.

The Bahmani kingdom had been, for nearly fifty years, drifting towards the fate of all medieval monarchies viz. break-up due to the power of provincial governors. This process was hastened to a great degree by the constant friction between the factions of the Deccani or native noblemen and that of the foreign nobility. The year 1527 A.D. saw the end of the process of disintegration. It was then that the five independent monarchies or Shahis, as they are better known, crystalized themselves. Malik Ahmed Nizam-ul-Mulk of Ahmednagar, Yusuf Adil of Bijapur and Fathullah Imad-ul-mulk of Berar proclaimed their independence in 1490 A.D. Amir Ali Barid of Bidar was the last to do so, who by that act of his, brought to a formal close the Bahmani kingdom. This is not a place to go into any details regarding the history of these five States. A very broad outline can be traced as in the following lines. 'The history of these kingdoms is a record of almost continuous strife. The community of religion, the community of interests and frequent intermarriages were alike powerless to curb the ambition of the three great States, each of whom aspired to the hegemony of the Deccan.'[7] In addition to their mutual feuds, the five Sultanates had to face the challenge of three enemies successively. First was the Vijayanagar kingdom. No sooner were they able to get rid of this hereditary enemy, than they were called upon to stand up against the newly rising power of the Marathas. The last, and as time was to prove, the most persistent were the forces of the Delhi Emperor, who, as it were, was bent upon undoing what Ala-ud-din Bahman Shah had accomplished three and half centuries previously. 1690 saw the end of the Adil and Qutb Shahis at the hands of Aurangzeb, others had vanished before.

All the five Shahis inherited from the Bahmanis not only the political control of the regions concerned, but also the latter's taste for cultural refinements to a lesser or greater degree. All adorned their capitals with palaces and mosques, tombs and minars. The courts entertained talented artists and poets. All contributed to the development of military architecture in the area. And like their great predecessor always played host to foreign talent. Indeed, it is obvious from Ferishta's accounts that even as late as the days of Yusuf Adil Shah the kings depended more

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[7] *CHI*, 3,433.

on foreign mercenaries than their local troops. The only difference was that they had also learnt to appreciate and respect, and often utilise local art and knowledge. Foremost among the five was the Bijapur kingdom which has not only left a rich architectural legacy but was also responsible for the development of the Deccani school of painting. Most Adil Shahs were endowed with that rare gift, a mind imaginative in itself and also receptive to novel ideas. Accompanied by material prosperity, this led to a great spurt in activities artistic. The Qutb Shahis of Golconda occupy the next place in this field. They nourished another idiom of Deccani architecture in their capital. The most pronounced tendency of this school being its extremely florid though somewhat crowded surface treatment and the tall minarets clustering the skyline of Golconda.

III. DESIGN DEVELOPMENT

The importance of artistic traditions in planning of structures cannot be over-estimated. This is true of Islamic as of all other styles of architecture practised in India. The roots of a concept or principle cannot be easily found and generally one comes across a set of ideas and principles which have received sanctity not only through constant usage but also through social and religious environments. The roots of Islamic art traditions are buried deep in the past of the land of their origin — Arabia and Mesopotamia, or to use the latest term, Western Asia. Particles of truth have been sifted from the mass of orthodox ignorance. But conditions regarding architecture in India are better. A student of Islamic art and architecture in India is on a much more secure ground. In the first place, when one encounters Islamic monuments, the methods and forms have developed to an extent where they are easily recognisable. Secondly, they form part of a relatively later period and hence enough is known about their history to enable one to trace their further growth. Now, what are these principles and traditions ? Islamic construction everywhere is arcuate. All schemes and designs find expression through the medium of arches and arcades, vaults and domes. All decorative designs utilise arch and its combinations to a degree in which no other single motif is. The arcuate construction has imparted a predominantly geometric bias to all designing and planning.

Along with the arch and the dome, the minaret forms an almost inevitable part of Islamic structures. The lone towers such as Chand Minar appear as entities in themselves, but the true function of the minaret, in its Indian and more especially Deccan version, is as a member of the overall architectural scheme.

The plans of the main types of religious structures, viz. tombs and mosques, so also secular structures like the madrasas are fixed by tradition. They are determined by the function a particular building is expected to perform, and as such are constants. There are practically no departures from the universal pattern. Wherever there is such a departure, it stands in isolation, not to be copied and emulated but to be looked upon as an idiosyncrasy, whatever be its merits. In secular buildings, like palaces social customs like the seclusion of female apartments etc. have played a role in determining the plans. In a very general manner it can be said that plan is a thing with which Deccani architects have not played.

While planning a building, two aspects can be emphasized. Either

the distribution of mass or the creation of an outline. In other words, the buildings can be conceived in trigonometric i.e. three dimensional or geometric i.e. two dimensional terms. An architect can create the impression of solidity or can go in for a plain picture. As a very general principle it can be stated that Islamic architects have a predilection for the two dimensional or geometric planning. The possibility of having both the effects in a single building is not excluded, but such instances are rare in the extreme. An architect prefers to choose either of the two, for, each type envisages its own plans, elevational aspects and decorative methods. They affect both the organic and applied ingredients of a structure.

The effect of mass can be achieved by constructing a building with huge dimensions. Or, it can be brought about by a proper adjustment of the shade and light values, because, it is this element that gives the impression of mass, of three dimensions, of projection and recess. This adjustment calls for the erection of several plains in the walls of the building arranged at various angles to each other so as to reflect sunlight in differing degrees. The best example of such a structure would be the Hindu temple with a star-shaped plan. Here the shade-light pattern is skillfully utilised to create the effect of mass. Obviously, this entails a change in the plan of the building, a thing practically impossible to effect in the case of the mosque or the tomb. Secondly, the ornamentation of such a building depends upon sculpture — preferably in high relief. Human figures, animals and plants form very good subject-matter for this mode of decoration. The first is proscribed by Islam. The geometric and arabesque designs so popular in Islamic art do not go well with high relief.

In the case of buildings visualised as a picture, as an essay in two dimensions, two factors are important. First, the outline of a structure would cut against the skyline. Secondly, the decoration of vast plain surfaces. The central dome and minarets, along with parapet crestings are features that aid the creation of a well-balanced outline. The surface decoration consists of stucco designs in extremely low relief, painted designs, and patterns of glazed tiles or mosaics. In later structures where stone is used, as at Bijapur, the relief continues to be low. At the same time, however, the Deccani architect now shows a better appreciation of the three dimensional way of planning. But this goes only so far as the adoption of some stray features like the heavy bracket cornices of Hindu temples. Some features like the projecting corner minarets or turrets as those on the Gol Ghumat at Bijapur have a similar effect. But no changes in the plans are to be seen. Orthodox planning continues to govern the thinking.

It is quite common to say that the Deccani architecture was influenced by the local Hindu traditions. In support of this statement,

either some such vague terms as "the unmistakable touch of South Indian beauty",[1] are used or attention is drawn to features of Bijapur structures like those mentioned above. Talk of cultural contact and synthesis is sweet but is not always supported by facts. What the Bijapur buildings display is a newly awakened appreciation of Hindu concepts of beauty and planning, and not a change in the attitude of Islamic architects. There is very little doubt that the same principles continued to inform the planners of seventeenth century as the ones that had inspired the architects of the fourteenth century. Traditions die hard. And Islam is a conservative religion. In its main traits Islamic design continued to be two dimensional, and the various monuments attest to the natural and organic growth of this idea. From Persia new shapes and novel methods of ornamentation in the form of glazed tiles were borrowed. From the Deccan the stone carvings and the cornices and brackets were adopted. These were stray features and did not alter to any degree the basic concepts of designing. The core remained Islamic maintaining its continuity and individuality. Nothing can better illustrate the truism of this statement than the fact of the existence of large-scale colour ornamentation on the tomb of the Ibrahim Rauza. It would be readily agreed that this building is a genuine representative of all that the Bijapur style had to display. All the 'Hindu' features, heavy bracket cornices, sculpture, etc. are most profusely used here. However, it seems none has taken note of the paintings on the walls.[2] They are faded all right, but still they are there. The structure is in black trap and does not serve as a proper background for the paintings. It is so singularly unsuitable for the purpose. It is the very reverse of decoration. And the paintings are there for the simple reason that it happened to be a component of Islamic building traditions, which the architect was unable or unwilling to set aside.

This search for the development of design lands a student in one important difficulty. It is the chronology of known monuments. The logic of stylistic growth suggests a succession of artistic forms. Each succeeds a less artistic form and embodies a step further. When one turns to the existing monuments, it often so happens that a form which should stylistically come later precedes a less developed stage in respect of time. The form that would represent an elementary step actually comes much later, thus apparently turning things upside down. One faces a dilemma where either chronology is to be accepted as a guide or artistic growth

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1 *CHI*, 3,633.

2 COUSENS has mentioned the existence of colour, but he has taken it to be part of the various lettering schemes. As the reproductions of the colour-work on the Ibrahim Rauza on figures 16 and 17 would show, this is not the case. They are not parts of the lettering scheme, but are paintings or colour-ornamentation in every sense of the term.

is to be taken to be the principal consideration. As just stated, their claims are often mutually contradictory. To cite an example, if one takes into consideration the facade of the tomb, the treatment consists of a number of arched niches. The primary stage is one entrance arch with the rest of the wall blank. Next comes the introduction of arched niches on either side of the entrance arch. Five or more niches would represent a further development of the idea. However, this is not borne out by the known dated structures. The first one is all right, as seen on the earliest tomb structure of the region, viz. the tomb of Ala-ud-din Bahman Shah (1358 A.D.) at Gulburga. The second stage is seen on the tomb of Chand Bibi, which is a Nizam Shahi structure, while the third one is utilised for the tomb of Firuz Shah (1422 A.D.) which antedates the Chand Bibi monument. It is likely that the elementary stages were practised on buildings which are insignificant or have disappeared in the course of time. This is just a possibility. Secondly, and this is a more plausible explanation, individual artists travelled the same logical path of the progress of design schemes, but did not give material shape to all the stages. They selected those that appealed to them most. As such it is not at all necessary that all the various stages should be seen on the extant monuments. And, therefore, chronology of known monuments can be to some extent ignored if the logic of stylistic development can be traced without any fallacy. This is no doubt a controversial aspect, but this is the only approach that would enable one to know and understand the real significance and meaning of architecture and its growth.

IDGAH

The idgah or open prayer place is common all over the Islamic world. In the Deccan numerous places have these idgahs. The Indian idgah does not seem to be far from the 'Musalla' of Western Asia. The latter is defined as "a large threshing floor or a clearing with a wall provided with a mihrab";[3] there is also an elevated place for the Khatib. Here the salat is performed on certain occasions. The first musalla, like most things Islamic, is attributed to the Prophet. It is supposed that although he performed his usual salats in his mosque, he travelled to a spot on the south-western outskirts of Medina for important salats. Here on Id days all the religious rituals including the slaughtering of animals etc. were performed. Some authorities like WENSIK maintain that using a threshing ground outside the limits of a locality for prayers and sacrifices was a pre-Islamic practice. And in view of the fact that the ritual of sacrifice is itself a continuation of pre-Islamic traditions of the region, there is no reason to reject this view. Secondly, it is natural for the peasant communities of the days to use the very good clearing, used for threshing, as communal meeting ground. The main advantage of this

[3] HOUTSMA, ARNOLD and others, *Encyclopedia of Islam*, Vol. 3, p. 746.

open prayer place, the musalla or the idgah, is that it can accommodate large crowds.

There is no need to think that the Idgah or the musalla were developed completely during the times of the Prophet himself. It is recorded, as stated above, that he used a large open space outside Medina for purposes of ceremonial prayers. But whether there was a wall with any religious significance attached to it, in front of the open space is doubtful. And whether there were the mihrab and the mimbar adjoining this wall is more doubtful still. The original mosque built by Muhammad did use first its northern wall (for Jeruslem) and then its southern wall (for Mecca) for the purposes of orientation. But there was no mihrab in the walls; it came later. Muhammad made use of a palm trunk to elevate himself above the masses in his front. This crude platform is probably the origin of the mimbar. And it is more than likely that the use of the wall of the mosque suggested the idea of providing the mihrab and mimbar to the wall of the musalla. The mosque i.e. the quibla wall of the mosque and the idgah developed simultaneously and just as all the components of the mosque, more especially the mihrab, were not evolved during the life-time of Muhammad, so also the musalla or idgah was only partially developed. The adoption of the mihrab to signify the direction of the prayer took place simultaneously in the mosque and the idgah.

From the point of view of architectural evolution one must visualise a plain wall with a mihrab and a mimbar attached on its side that faces the open space. This wall in this particular aspect would be a nothing for architecture. As time went on measures must have been adopted that would beautify to a certain extent the bare wall. The idgahs in the Deccan present various aspects and many of them are quite curious. Here the sequence of its design, as probability would have it, is traced.

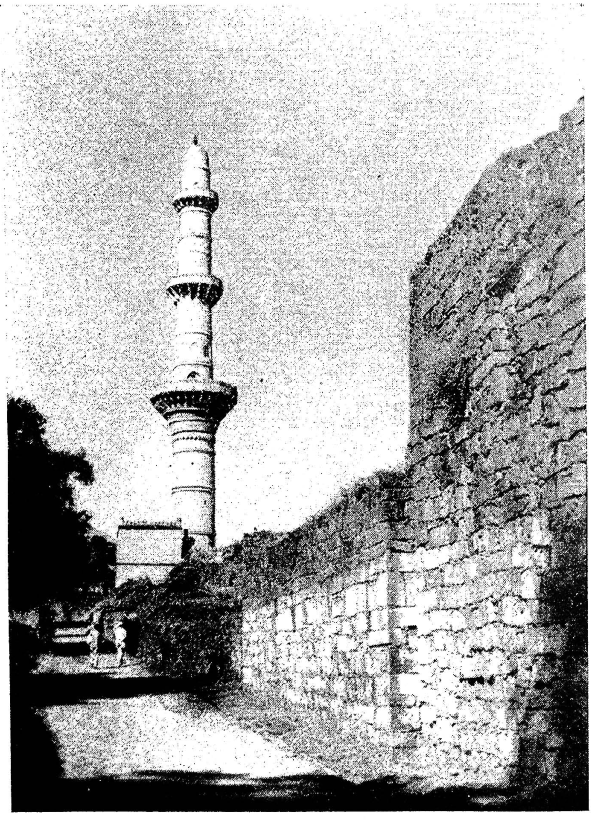
The sheer wall would present one difficulty. It would be something loose, without any firm footing. More especially with the central portion emphasised by the mihrab and the mimbar, the ends would seem to be hanging loose. The best way to remove this deficiency is to provide the ends with something structurally solid — like the tapering bastion. These turrets would afford excellent moorings to the wall ends. A very simple but good-looking example of this elementary method is seen at Nevasa in the Ahmednagar district. The bastions have a taper upwards and there is a slight convex curve in the vertical outline (elevation) of these turrets which combine grace with strength. The idgah is presumably built during the Nizam Shahi rule. As found in some later structures, this effect is achieved, although to a comparatively lesser degree by the erection of rather heavy minarets on both the ends. However, the way in which the minarets came over here is not the same as the turrets and

is discussed later on. For the present, the basic stage, that of converting a wall into the semblance of a structure is over.

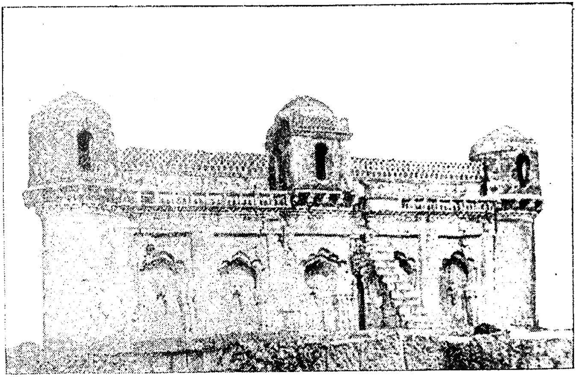
Sketch of an idgah at Nevasa.

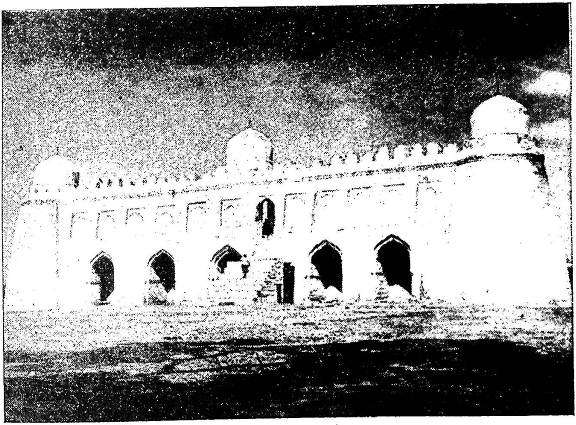
The next problem would be to decorate the surface of the wall, as also the outline it would cut against the sky. It is only one surface of the wall, one which opens out on the space meant for prayers, that is ornamented. The only kind of decoration applied seems to be arcades in relief — or arched niches. A number of these arched niches often with double or treble recesses flank the mihrab. There is very little doubt that the quibla wall of a mosque has served as the model for this wall consciously or otherwise. In the case of the mosque it is the result of the methods of construction; here it is the result of the appreciation of its artistic value. The arches of the niches are of the pointed variety. Very often the entire surface of the wall is divided into five or seven rectangular panels each containing recessed arches of the pointed or multi-foil design. Along with the development and elaboration of the general architectural trends, several novel features came to be introduced in the idgah also. Especially the extreme floridness of the late Qutb Shahi style reflects itself most faithfully in the stucco decorations of the idgah at Koilkonda — to choose one of the many examples. The decorations and designs are discussed in a separate section; just now suffice it to say that they were not far different from those used on mosques, i.e. the facade walls of the mosques. In addition to these, a feature, not decorative, but which somehow creates that effect is the 'Dakka'. This is a platform to which a stair-case leads up. This in a way is the enlargement of the mimbar and this 'dakka' is used only in the case of larger structures.

The other problem, namely, that of the outline of the wall is solved in the most orthodox Islamic tradition : slightly emphasised centre balanced by minarets or turrets on either flank, plus parapet cresting of various shapes. Several methods are utilised for this purpose. The idgah being only a wall, there was very little space, at least in the primary stage, for any central dome. This was replaced by a flying arch of the



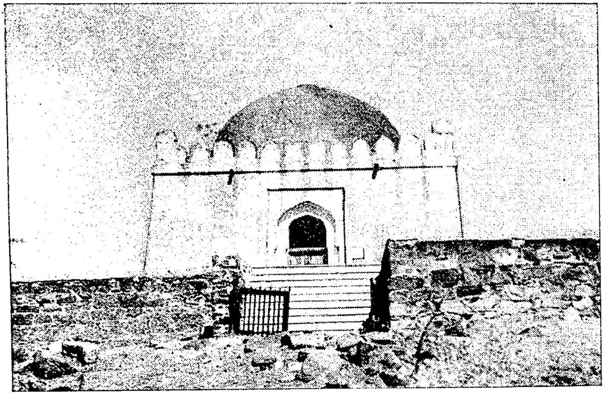
CHAND MINAR : : DAULATABAD FORT

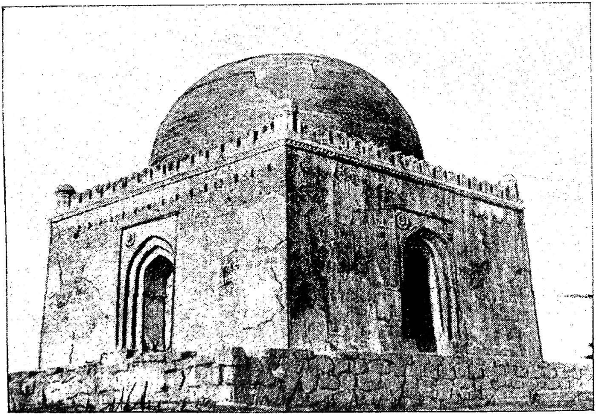




TWO LATE EXAMPLES OF THE DECCAN IDGAH. [ABOVE] THE IDGAH AT KOILKONDA. [BELOW] IDGAH AT BIJAPUR

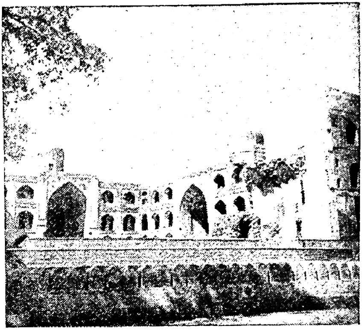
From the bear walls of the earlier period the Idgah has now developed into a three dimensional structure.



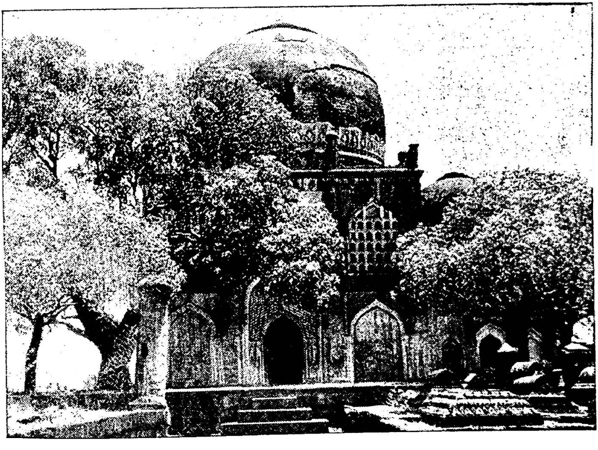


EARLIEST TOMB STRUCTURES OF THE DECCAN
GULBURGA

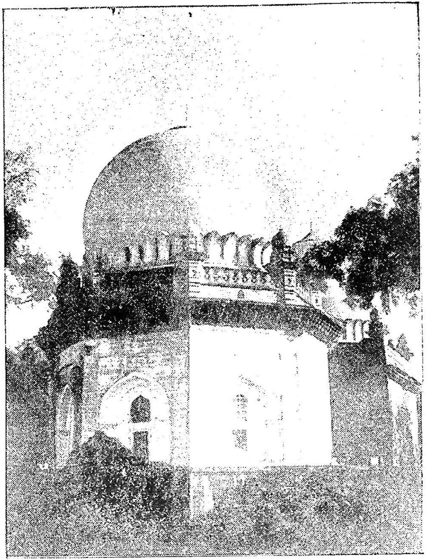
Upper : Tomb of Hasan Gangu Bahmani. Lower : Unknown (?)



THE MADRASA OF
MAHMUD GAWAN
BIDAR



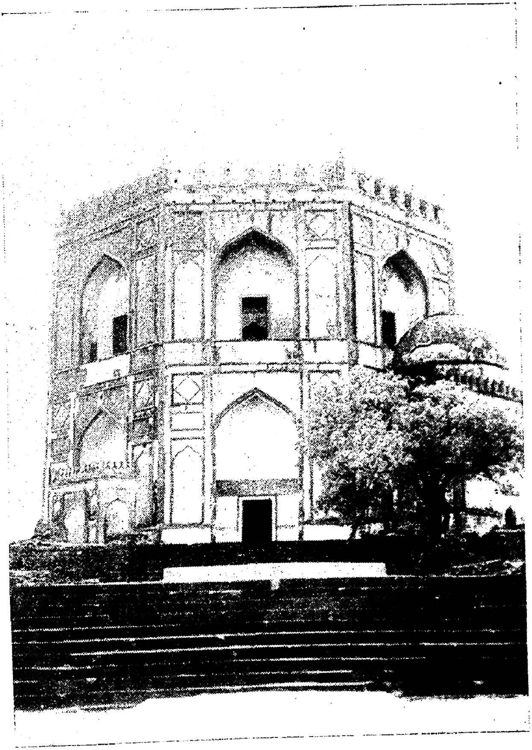
TOMB OF HAZRAT MAKHDUM QUADIRI : BIDAR



OCTAGONAL TOMBS

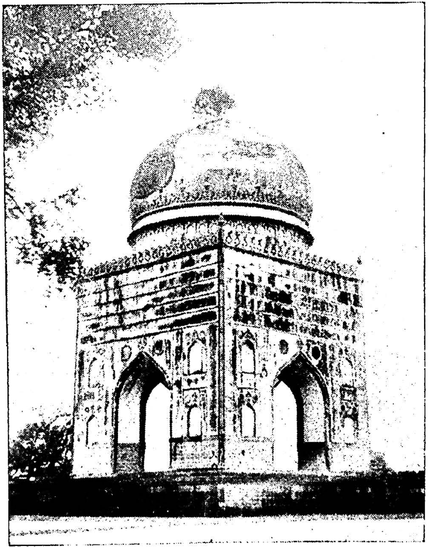
(a) Tomb near Ibrahim Rauza; Bijapur.

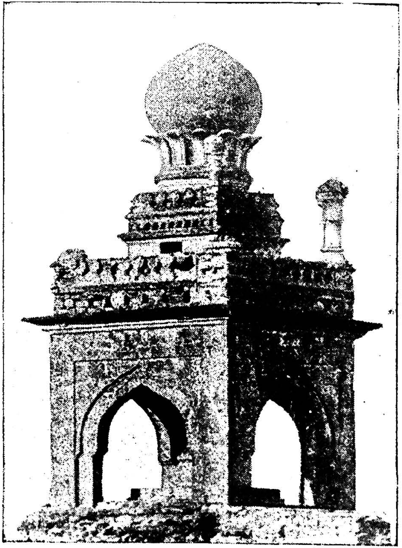
(b) One of the Jod Ghumats; Bijapur.



CHAUKANDI : BIDAR

Tomb of Jamshed Quli Qutb Shah : Golconda

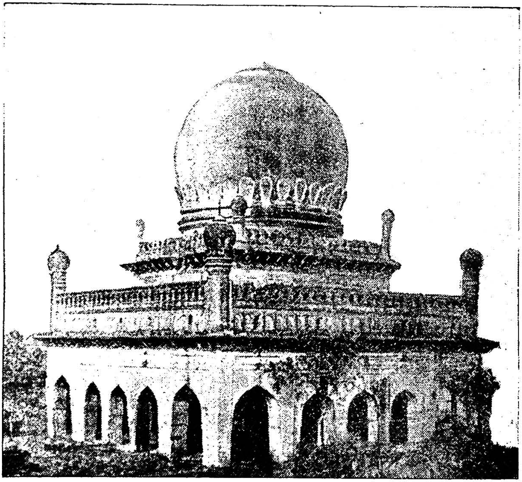




CHHATRI STYLE TOMBS

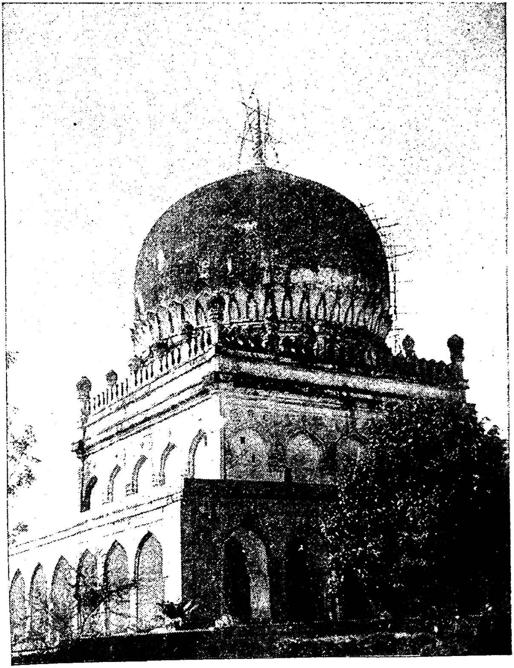
(a) Tomb of Sultan Ali Barid : Bidar

(b) Allah Baba's tomb : Bijapur



TWO-STOREYED TOMBS

Afzal Khan's tomb, Bijapur



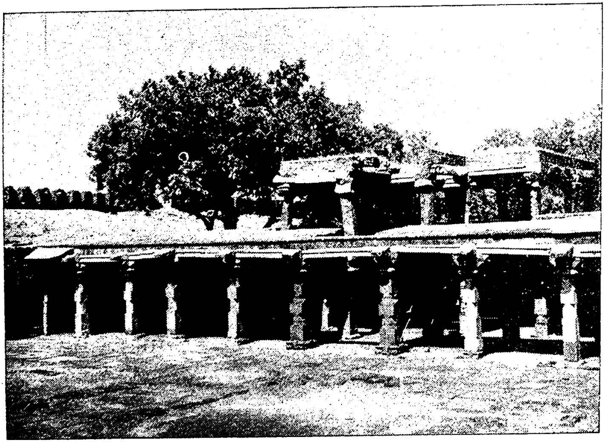
TWO-STOREYED TOMBS

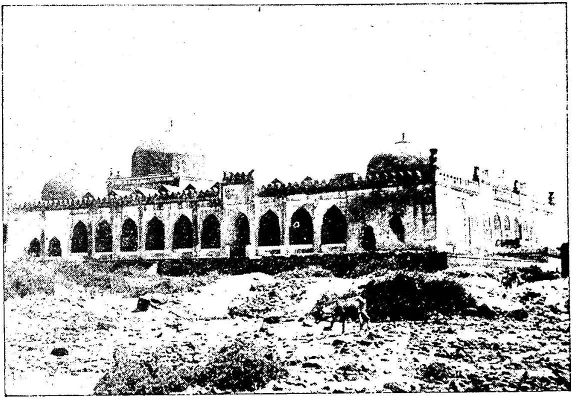
Tomb of Sultan Abdullah Qutb Shah, Golconda

KARIM-UD-DIN'S MOSQUE : BIJAPUR

This is one of the earlier mosques erected in the Deccan. As the pillars make it obvious, it was constructed out of materials of Hindu temples that were pulled down. And but for the plan, which adheres to the orthodox pattern, it is most unlike a mosque structure.

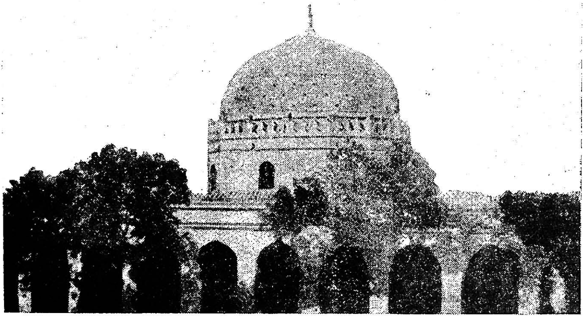
[See page 34]





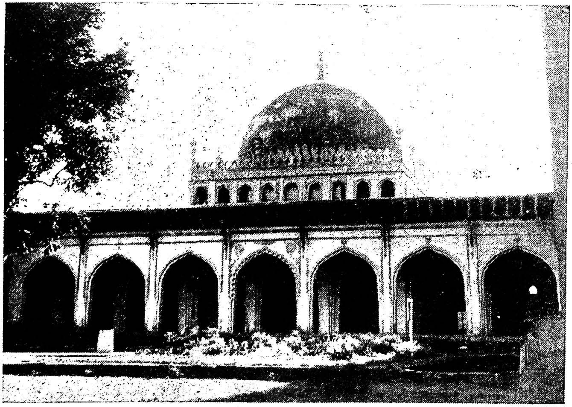
THE JAMI MOSQUE : GULBURGA

This is an unusual type of mosque. Although the essentials of a mosque structure are all there, they are transformed into a novel design by covering up the space that usually forms the open courtyard in front of the liwan. Its arches and domes have a shape uncommon to other Gulburga buildings.



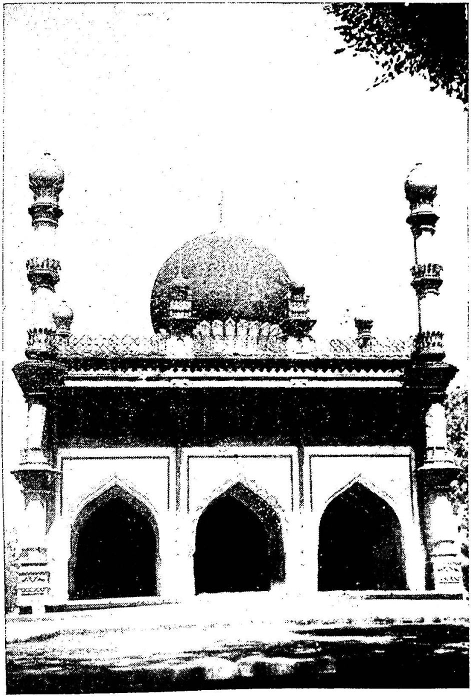
THE SOLAH KHAMBA MOSQUE
BIDAR FORT

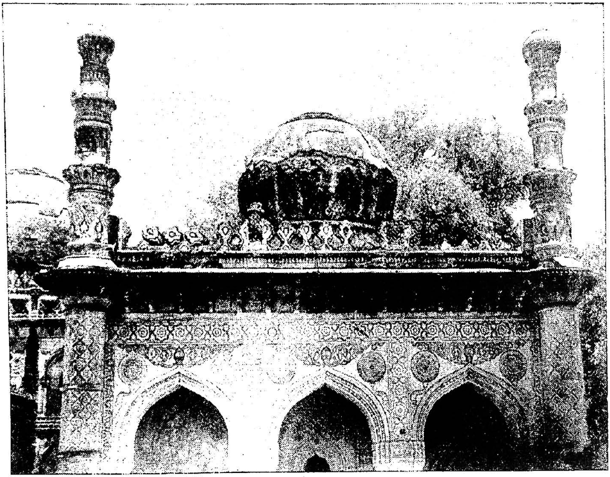
JAMI MOSQUE : BIJAPUR



MALIKA JAHAN BEGAM's MOSQUE :

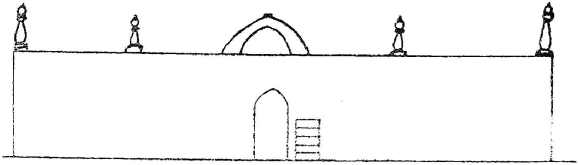
BIJAPUR : An extremely pleasing and well-balanced mosque structure. No member, neither the minarets nor the dome get undue emphasis and hence the impression of harmony is unmistakable.





MOSQUE NEAR TOMB OF HAZRAT QUADIRI : BIDAR

This is another example of a well-balanced elevation. As in the structure shown in the previous plate, no member gets over-emphasis. Also noteworthy is the intricate stucco ornamentation.



Sketch of an idgah at Ahmednagar

appropriate size and shape. And on both sides minarets of light nature that would go flush with the flying arch were erected. An idgah at Ahmednagar illustrates this type very well. Soon, however, the size of these walls increased greatly and it was possible not only to build a dome on the central portion, but even to erect cupolas over it. Increase in size made the use of several devices feasible. As just mentioned, on the central portion a dome or a cupola-like room with a domed roof was erected. To support this room the central portion was projected forward considerably. Staircases were built in the main wall to reach the cupolas. In addition to this dome and cupola, similar structures were erected over the flanking turrets. Very often the upper storey projects much beyond the diameter of the bastion supporting it. Heavy stone brackets of the south Indian style support these projections. The cupolas look extremely solid due to the lack of wide openings in their walls while their overhang make the idgah seem extremely top-heavy and ill-balanced. It might be suggested that these were crude copies of the cupolas that the Mughul and Rajput architects used to so good a purpose. But the slender pillars and the broad arches making for wider openings that make these structures so light and graceful in appearance, are absent here. The cupola-like structures are visible only on late idgahs and it is obvious that this is a case of ill-conceived adaptation. [See plate I].

Thus three well-marked types can be distinguished in the Deccan idgahs. Each represents a stage in the development of the idgah design. Each stage is utilised as a separate model by itself and hence we find that most of the idgahs of the region fall closely in either of the above three categories. Out of these, it is only the second variety, that of the Ahmednagar idgah that is really important. It embodies so well the Islamic conception of structural beauty, the idea of the balance in the outline of the building. The problem and solution present themselves here in their most elementary form.

TOMB

The structure of the tomb is common practically all over the Islamic world. 'From the earliest times to which it can be traced the Syro-

Egyptian mausoleum has its own style : a cubic room on a square base with a vaulted roof'.[4] The same can be said of tombs in India in general and the Deccan in particular, the important difference being the roof was domed and not vaulted. Later developments might effect various changes but the original prototype is unmistakable. The first well-known mausoleum in the Deccan, that of Ala-ud-din Bahman Shah at Gulburga represents a stylistic idea, so does the last important one, the Gol Ghumat at Bijapur. In between these two are several monuments that reflect the various stages of the development of this architectural concept as well as its various branches. The aspects relating to construction and ornamentation are discussed separately; here the evolution of the important features in the design being studied. The common tomb structure is a square chamber containing the sepulchre. To quote the *Encyclopaedia of Islam*, 'For the dead of the lower orders a grave is sufficient. Those of the higher classes, not content with a grave require a mausoleum.'[5] Probably the Deccan was always bristling with 'those of the higher classes', for, the number of tombs in this area is literally innumerable. Generally, these structures are conceived on a spacious scale and it is their size that impresses the onlooker more than any other thing.

Before entering into a detailed discussion of the aspects of the tomb-structure as a type, it would be useful to describe the tomb of Ala-ud-din Bahman Shah as the proto-type for future progress. This structure is modelled after the Pathan structures then current in the imperial city of Delhi. The tomb follows the main characteristics of the parent type quite closely. It is a chamber square on plan with very thick walls, roofed over with a dome. On all the four corners are short minarets of a peculiar design. They have deep flutings and create the impression of a bundle of a number of cylindrical objects. The tops of the wall carry parapet crestings similar to those commonly used for forts. The walls of this tomb have a very pronounced taper upwards. This taper creates the impression that the walls and consequently the entire structure are standing four-square on the plinth. Similarly, the dome with its near hemispherical section rests squarely on its base. These features impart to the building a strength and vitality, which mere large dimensions do not make for. [Plate II].

Later structures show that the Deccan architects developed this basic structure in a number of ways. The first important and most notable change effected in the succeeding buildings is the elimination of the taper or slant in the wall. It was indeed the elimination of a valuable architectural device, a device that was meant to lend strength to the structure. In other respects, both as regards the plan and elevation, various

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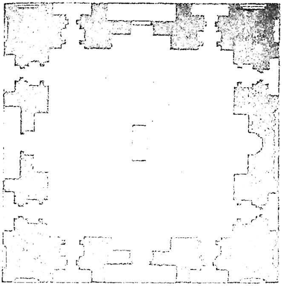
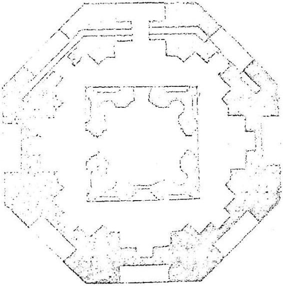
4 *Ibid.*

5 *Ibid.*



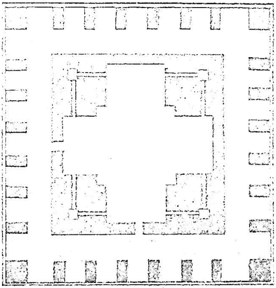
(a)

Tomb of Ahmad Shah Wali : Bidar



(b)

Tomb of Hadrat Khalil-ullah : Bidar



(c)

Plan of the tomb of Muhammad Qutab Shah : Golconda.

Fig. 3

After G. Yazdani in 'BIDAR'

improvements were made. It might be remarked that in spite of these improvements, the tomb structures, except in very few cases, present an appearance so uniform as to verge on the borders of drab monotony. Not because there is no divergence in the artistic detail, there is abundance of it, but due to the fact that some features have been adhered to with a fanatical persistence. Two aspects of a building are to be considered in this respect. First is the plan and second is the elevation. They cannot be torn asunder being parts of a single unified design. At the same time they yield most fruitfully to separate analysis. Both of these seem to be governed by artistic and ritualistic traditions. The most common and orthodox plan of a Moslem tomb as stated earlier is the square. The vast majority of Moslem tombs are on this plan. Their dimensions might differ but they are square all the same. It is only in the later phases of Deccani architecture that a variety of plan is obtained. Next to the square the octagonal plan prevails. Two examples of this type of plan can be seen in the Jod Ghumat at Bijapur and the mausoleum of Jamshid Qutb Shah at Goconda. [Plates IV, V, VI]. This refers to the external outline of the plan. Internally there might be a composite variety of an octagon and a square as seen in a Golgonda tomb. However, this relates mainly to matters regarding the techniques of construction and has very little effect on the external appearance of the structures. Notice in detail, therefore, might not be taken. Another alteration is the introduction of an open aisle or arcade around the square chamber of the tomb. This is a method employed mainly for the purpose of effecting changes in the elevation of the structures. The arcade or aisle rises up to the height of a single storey, while the central chamber rises up to two or more storeys. Here also a noteworthy fact is that it is at Bijapur and Golconda that this type of plan is found. The famous tomb in the composite tomb-mosque, Ibrahim Rauza at Bijapur, in the tomb of Afzal Khan at the same place and in the mausoleum of Abdullah Qutb Shah at Golconda is this change of plan visible. [Plate VIII]. To put in a nutshell, the square form of plan dominated the conception and construction of Deccani tombs. This imposes a great restriction on the elevation. One vast plain surface necessarily becomes the dominant element in the elevation. Out of the two, the plan and elevation, it seems certain that the plan had a sanctity, grown out of orthodox religious tradition and usage, for it is the elevational aspect that is subjected to alterations and improvements while the plan is left untouched. [Figure 3]

In the late manifestations of the Deccani tomb, a new design seems to be creeping. There is no mistake about the original prototype and the source. This is the 'chhatri' or cupola type of tomb. The chhatri was fully evolved in Rajasthani architecture and resembles closely the open pavilions so common in Mughul architecture. This kind of structure is either square or octagonal on plan and the domical roof is supported

by slender pillars or piers leaving large arched openings in place of surrounding walls. It is at Bijapur and Bidar that a number of these structures occur. The tomb of Allah Baba, the green stone tomb at Bijapur and the dog's tomb and the barber's tomb at Bidar, belong to this variety. However, the Deccani architects could not bring that touch of grace and the feeling of lightness to their strucures. [Plate VII]

ELEVATION

The traditional elevation of a tomb as represented by the mausoleum of Bahman Shah at Gulburga, consists of four elements. First is the dome. Next come the minarets, thirdly the parapet crestings and last and most important a huge wall surface. All these go in to create a combined unified effect, a united whole. The problem naturally is to effect a balance and harmony amongst all these. The solution is by no means easy, it again brings us down to the fundamental issue, viz. the ideal form of architectural construction as visualised by Islamic artists. A number of lines has already been devoted to the discussion of this point. However, a very general conclusion can again be stated here profitably. The Islamic artists, at least as far as the Deccan was concerned, occupied themselves more with the betterment of the general outline of the structure than with the better arrangement of mass. The tendency is towards better balanced and finer curvilinear silhouette, very often at the cost of the mass and weight of the building. This is a very broad and general statement and there is no denying the fact that there are exceptions to it. But there is no need to enter into the same discussion again. A restatement would suffice for the present purpose.

The very first example spells out a certain concept regarding the visualisation of the elevation. Although as stated above, the entire structure presents an appearance of strength no single element has been given prominence. The dimensions of the lower structure and those of the dome are so arranged that none seems to dominate the other. Secondly, unlike the mosques and the later tombs the early structures do not use three-point balance i.e. the minarets on either side are not big enough to distract attention from the height of the dome. In late examples this system is used, but more about it later. Minarets are there but they do not play any significant role in the over-all composition of the elevation; they are there through convention and usage. Can the balance between the two aspects of the facade, viz. the wall and the dome be defined ? This question of harmony and balance is one that belongs more to the field of subjective taste than scientific definition and calculation. Hence no hard and fast rule can be stated. However, certain points might be mentioned profitably. In the first place, the wall i.e. the cubic sepulchural chamber is the main building and the dome is its roof i.e. the dome is meant for the building and not *vice-versa.* Neither should the dome

look too insignificant nor the lower structure too much oppressed below the roof. Instances can be pointed out where due to inescapable subjective ideas of beauty both these deformities have been brought into existence. To cite examples, the dome of the tomb of Hadrab Qadiri at Bidar is so large as to cripple the structure under it. While the structure known as the Dog's Tomb from the same place has a dome too small to grace the building.

A change most intimately related with the balance of the elevation is the introduction of storeys in the tomb. Internally there need not be so many horizontal divisions, externally however, three distinct plains are visible. The lower storey is the one with more breadth, upper with less and the topmost less than that. This is a double-edged device. By the introduction of the pyramidal sort of aspect, it gives a better balanced horizontal top-line and also greatly relieves the vertical strain the earlier structures exercise.

The elevation is considered here from the two dimensional point of view. The balance and harmony of the outline of the structure is examined. Its effect on the arrangements of mass and weight are highly important. The earlier outlines make for solidity, the later for lightness, this irrespective of size. However, when one notices that the main problem to which attention was devoted was not so much mass as line, an appreciation of the Deccani works becomes easier. It is then quite clear that the Islamic architect has been able to maintain a very well balanced elevation. Even in the later stages with a trend towards the unorthodox, very few important structures display anything fanciful or crazy. The later outlines, more curvilinear and with graceful shapes are probably aesthetically superior to their robust predecessors.

With these remarks a detailed examination of the various component parts of the elevation can be now undertaken.

DOME

The original model has a dome the outline of which is hemispherical or its lesser section. A dome with this section appears as if it is resting squarely on the substructure. The eye moves smoothly over the outline — no angles and no sharp turnings are necessary. The outline falls down in a stately downwards flow. This imparts the structure a majesty and weight of its own. In some cases, the dome is raised on higher drums and the outline is not spherical but ogee. This change is seen not only on structures with Persian origin like the Jammi Masjid at Gulburga, but also in various later buildings like the Hadrat Makhum Quadiri at Bidar or the one at Fatehpur. Another change, popular in the Deccan, is the introduction of the spherical or the celebrated bulbous dome. With its raised drum this kind of a dome is an extremely artistic

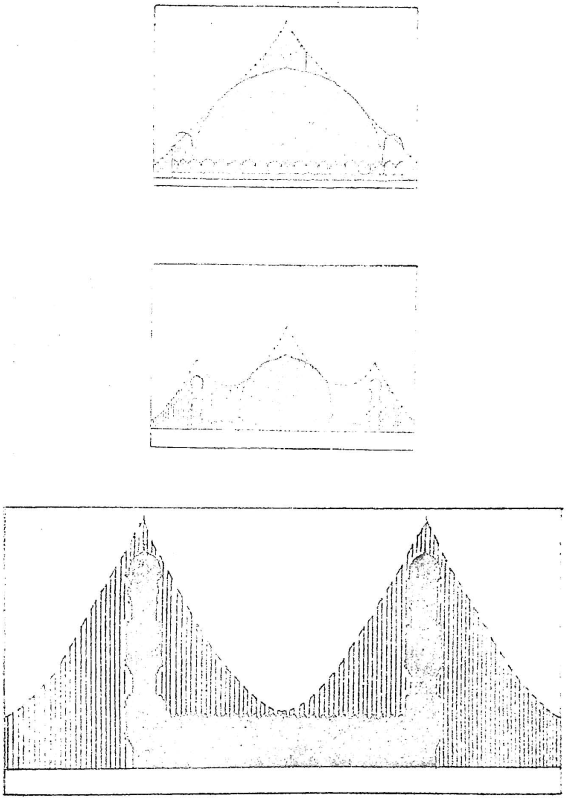


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Fig. 4

Diagrams showing changes in the elevational aspect.

device, but it is very tricky. More often than not the size of the bulb and the inward sweep of the outline have the effect of disjointing it architecturally from the lower structure. To obtain balance in such cases, some alterations were made in the other components of the elevation. So long as the dome covered the entire lower structure or a sizable part of it, as in the case of the tombs at Gulburga and Bidar, the dome and the lower structure together formed a unit complete by itself. With the reduction in the area to be occupied by the dome large spaces were left empty on its either side and it was necessary to evolve some means or a scheme for the upper structure in this context. To fill the gaps in, more emphasis was laid on the minarets turning the entire outline of the structure into what can be called a three-pointed one. This three-pointed outline is visible all over Bijapur. [See Figure 4]. At Golconda also this tendency is evident. But a step further has been taken there, and instead of the two flanking minars, we have several, breaking the horizontal plain. The Jammi mosque at Bijapur is very significant in this connection. The contraction of the base of its dome is slight and it resembles the earlier hemispherical domes. As in the latter, so in the former — minarets are subdued. They need not be prominent for reasons explained above. Some typical domes can be cited below. [Figure 5].

Gulburga domes : These domes are a roof over the building in every sense of the term. Their sides are nearly straight and if they do not move outwards, they do not contract below the dome. The early tombs at Bidar utilise similar domes. The tomb of Ahmad Shah Bahmani has a dome not quite dissimilar to the earlier Gulburga buildings. One change is, however, marked there and that is the raised height of the drum. Not only that, but in the earlier structures this necking was not given any individual expression. Here this drum or necking is well-marked.

Bidar : The dome over the tomb of Qadiri is a typical example of a highly stilted dome. This is notable more because of the curves of its lines. They are what may be called ogee. But slightly so. This feeling is most emphatic in the case of the tomb at Fatehpur near Bidar.

Bijapur : Here the outlines begin curving inside the dome, i.e. giving it a spherical shape. The tomb of Chand Bibi and the dargah of Hazrat Khwaja Banda Nawaz at Gulburga display this tendency in a markedly restrained fashion. The curvilinear trend is manifestly there, but the dome still maintains its dignity, its weight. The Bijapur domes throw away this restraint and go in full length for the spherical or bulbous shape. Very often they do not roof over the entire structure, they are placed on it.

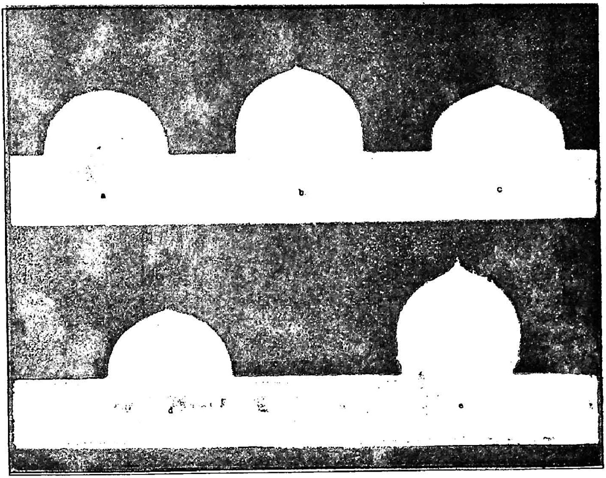


Fig. 5 *Outlines of Domes*

MINARETS

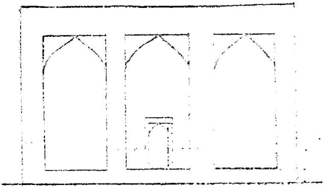
Minarets standing independently such as those at Daulatabad, Bidar, Raichur, etc. as well as those functioning as parts of buildings have been discussed fully in the relevant section. Their role as members of the elevation has been indicated above. As a rule, applicable in most cases, it can be stated that the lighter, more insignificant the central feature of the roof, i.e. the dome, the more prominent and heavy are the minarets. Nowhere in the early buildings are the storeyed tall minars of Bijapur and Golconda to be encountered. The development of the minarets in relation to the facade of the mosque is greatly interesting and that discussion in the section on 'mosques' might be consulted at this stage also. The minarets flanking the dome were always there. But the thing that is new is the shift in the emphasis. This change is so profound that ultimately it results in a total eclipse of the dome as at Golconda and Hyderabad.

CORNICE

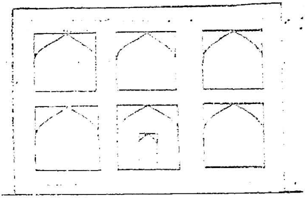
A novel feature, obviously an adoption from local building art, the heavy cornice, imprinted itself very strongly on the monuments at

Bijapur, Golconda and Hyderabad. Nowhere in early structures, viz. the buildings of the Bahmani period, do we come upon this feature. As most planning in Islamic architecture is the arrangement of plains and lines on a two dimensional geometrical basis, there is little scope for the type of cornice that was adopted. This cornice is of the type used on Hindu temples, it is in itself a rather heavy looking affair, and juts forward from the wall powerfully. If the circular section bestows on it some grace, its thickness in appearance clinches the impression of heaviness. And the projection from the wall is pronounced enough to affect the shade and light pattern of the building. This cornice is supported by brackets of a massive design. The two together, the cornice and the brackets form a part in the horizontal composition of a Hindu temple. They enjoy a very prominent rôle in the temple structure; the cornice does not merely indicate the end of one and the beginning of another storey. It marks it most emphatically; and in addition plays its role in the light patterns. It is rather interesting that amongst some of the few features the Islamic masons condescended to borrow from the infidels heavy cornice was one. In Islamic structures there is no need to emphasise the line, a mere indication would be sufficient. However, the cornice, brackets, projection, heaviness, have been borrowed bag and baggage. A number of structures of the late period show this feature. To cite a few, Afzal Khan's tomb, the Ibrahimi rauza and the Gol Ghumat at Bijapur and the tomb of Sultan Qutb at Golconda. All have prominently projecting cornices supported on heavy moulded brackets. This item has a two-way significance. It plays a role in the formation of the surface of the facade, also in the outline of the facade. Taking up the latter first, the cornice plays a role in the formation of the outline. It adds one more point that arrests the eye that is sliding down from the apex of the dome. In other words, it serves the same purpose as the minarets do — of course not in the same degree — of balancing the horizontal and vertical aspects of the outline. Any break in the outline can be pleasing to the eye, if it is not very violent. The dimensions of the projections of cornices on tombs are generally well-adjusted and do not violently disturb the grace of the outline. About the first aspect, it can be said in a very general manner, that when the whole tendency of the structures is towards the horizontal and when such a structure has a number of openings, the heavy shadows cast by the cornices do not go ill with it. But if the structure has a vertical emphasis and there are no openings, but only the usual recessed arches and panelling so common to tombs, the cornice is out of place. It cuts a majestic vertical sweep in two — to the great detriment of the building. The heavy cornice does not suit a structure the emphasis of which is towards large plain surfaces; it is suitable only to those structures that have accentuated the arrangement of mass by the introduction of wide arched openings, or the

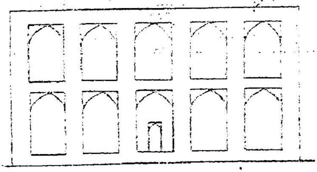
Walls of tombs



(a) Dargah at Nevasa.



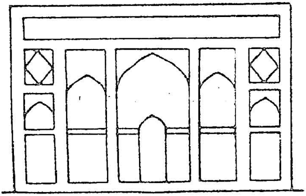
(b) Tomb of Chand Bibi, Gulburga.



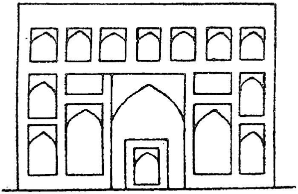
(c) Tomb of Firuz Shah, Gulburga.

Fig. 6

Walls of tombs



(a) Tomb of Ala-ud-din Bahmani, Bidar.



(b) Tomb of Sultan Ahmed Wali, Bidar.

Fig. 7

peculiar mouldings used in Hyderabad architecture at the point where the pier ends and the arch springs up. Earlier works visualised from a purely geometrical basis i.e. two dimensional basis — do not have any scope for such a cornice.

WALLS

Coming down from the cornice, the wall and the outline of the structure are to be noted. The effect of the slanting walls has already been pointed out. It is also mentioned that this feature was very soon eliminated and its place was taken by perpendicular walls. The treatment of the wall-surfaces is quite interesting in the case of tombs. It has assumed three main forms. All these are often used together and very few structures of consequence have used the simple or elementary form. This makes it difficult to trace the methods clearly. However, three chief modes of surface decoration of the walls are as below : [Figures 6 and 7].

(*i*) The wall is treated as one large plain and treated with panels of recessed arches or to be more precise, arched niches. Innumerable combinations have resulted in the application of this method. They are discussed in detail later on.

(*ii*) The storeys of the structure are marked out clearly by the introduction of an aisle all around the central chamber. The result is that instead of one, two distinct plains are obtained. These two, or if three-storeyed, three, plains are treated as in *i* or *iii*.

(*iii*) Here also two surfaces are envisaged. But they are two parts of the same plain and not two distinct plains as in *ii*. Keeping the large arched niches of the lower portion as in *i*, the upper part is treated in a different manner, in which small rectangular openings dominate.

In addition to these three, other devices are also utilised. These consist mainly of projecting pilasters, various recesses for the arches, stucco designs in relief, a projecting cornice and pronounced emphasis on the corner minarets turning them into something like turrets as in the Gol Ghumat. These methods, especially the first three affect the overall designing of the building in its two-dimensional aspect. This treatment, the result of the artists' desire to relieve the plain wall faces, in course of time came to affect the three dimensional aspect of the structures also. The large and numerous shadows cast by the different patterns led to the heightening of the effect of mass to a certain degree. However, this advantage was not exploited to the fullest extent, as the patterns were only in relief and there were no openings in the wall except the central entrance arch, in a large number of buildings. It is to be noted that the tomb structure is expected to present the same appearance from all the four

directions and as such all the walls are given the ornamental treatment. Fuller description of these modes follows :—

(*i*) In the earliest example the wall surface was a trapezium with an ogee arch in the centre for entrance into the sepulchral chamber. Then came rectangular or square wall faces with the entrance arch. This leaves large portions absolutely plain. To relieve this, recessed blank arches were introduced on either side of the central arch that housed the entrance. This is a method most commonly used in these regions. Numerous tombs have utilised this simple device throughout the period under consideration. The plain, pointed arches, the broad squat arches with low imposts of the Gulburga variety and the cusped ornate of Bijapur and Hyderabad, all shapes are used to decorate the walls. The wall-design of even the latest and grandest of them all, that is the Gol Ghumat at Bijapur revolves round the same concept. The next step is the introduction of five instead of three arches. These arches or niches as they really are, help to erase the monotony of the plain surface in its horizontal aspect. But the vertical strain is not relieved. A division of the entire surface into two or three parts solves the problem. Externally the structure shows two or more storeys although internally there might not be more than one. The niches are introduced in rows on the upper and lower storeys either three or five. (Chand Bibi's tomb and Firuz Shah's tomb at Gulburga). These arches are, from an early date, set in slightly recessed rectangular panels. This also makes for a kind of uniformity that is evident to anybody who has seen structures on which it is employed. A number of structures at Bidar display alterations in the pattern that introduce a change for the better. They are mainly in the proportions of the component niches and their disposition. The wall of the tomb of Ala-ud-din Bahmani is divided into five vertical panels. The central panel is broader than the rest and a recessed arch occupies it in its entirety. The parts immediately flanking it have arches less in height than the central one, the panels on the extremes have arches still smaller in size. And the space above them, remaining vacant due to the reduction in sizes, is filled in by lozenge designs in stucco. The tomb of Sultan Ahmed Wali at Bidar utilises a very similar arrangement, but here the sizes of the arches are reduced to a greater extent and a horizontal row of niches is introduced above the five arches. Other structures like the tomb of Qasim Barid and the tomb of Hadrat Makhdum have the three arched pattern, with the central arch much larger than the flanking ones. The main idea behind these arrangements is the prominence given to the central arch and a symmetrical disposition of arches in diminishing sizes. In more ornate and rich buildings this arched-panel has served as the basis and framework of stucco designs in relief or designs in colour, mainly with the help of glazed tiles. But the general lot has to depend on the arrangement of arches for their artistic aspect.

(*ii*) Tombs with two storeys, the upper one smaller in size than the lower one, are visible at Bijapur and Golconda but are absent from the early capitals. It is not only a development of the square sepulchre but also a novel exercise in designing. In buildings noted in (*i*) the arches seen on wall faces were elements of ornamental patterns. Now in the type under discussion, they are elements of construction. Arcading in the real sense of the term is implicit in the designing in most cases. The general effect of these structures has more of the massive in it. The open aisle all around creates deep shadows while the reduction in the size of the plan of the upper storey cuts a pyramidal outline that makes for the monumental, the solid. This new design was in all probability inspired by the mosque facades. The two approximate closely. The sepulchre of Abdullah Qutb Shah at Golconda illustrates this type of building in its most elementary form. The tombs of Shah Karim, that of Afzal Khan, and the Ibrahimi Rauza at Bijapur are of the same variety. However, in the case of the Bijapur buildings the strongly projecting cornices, the numerous minarets and greatly decorated parapets are likely to obscure the basic pattern of the facade.

(*iii*) In *i* and *ii* it is noted that the facade was divided in two horizontal compartments; also that both were treated with arched designs. In late Golconda and Hyderabad structures a marked departure occurs. The upper storey is much smaller in height as compared to the lower, and smaller motifs create a honeycomb-like effect. These consist of numerous small minarets, vertical rectangular and arched openings, parapet designs, brackets and stucco designs in high relief. A great crowding of all these elements very often takes place.

MOSQUES

The first mosques in the Deccan were converted Hindu temples. Destruction of the holy places of the Infidel and utilisation of the same material for construction of Islamic shrines were accepted practices. The Deccan has got several mosques of this variety. Notice cannot be taken of them all. Only those that help to emphasise the basic features of a mosque are taken into consideration.

The first, though not chronologically the earliest, to be considered is the Deval Mosque at Bodhan in the Nizamabad district of Andhra. Here, a giant Hindu temple is adopted as a Moslem shrine. The process of conversion is most simple. The image was removed and its niche replaced by a mihrab. A mimbar was constructed nearby and the entire western wall closed. No other alterations were effected. The ground plan and the original construction remained as before. To give it a 'respectable Moslem look', stucco domes were surmounted in the place of the shikhars. The conversion is ascribed to Muhammad Tughluq. A rather comic phenomenon is seen at Bid. Here the Moslems use the upper

part of a temple as a mosque while the lower storey is still a temple. The place is known as the Khanquah Deval. These two examples illustrate how all sorts of make-shift arrangements were undertaken to provide for the most pressing need of the ruling community. While doing this, no attention was paid to any other traditional features of a mosque except the mihrab and the mimbar.

A slightly advanced stage in the development is to be seen in the Jammi mosque in the Daulatabad fort, built of the materials of a demolished Hindu temple. Its author was Qutb-ud-din Mubarak Shah and its date is as early as 1313 A.D. This is one of the earliest mosques in the Deccan and has all the then common components of a mosque scheme. Here the entire court-yard measures some 206 feet square and is surrounded by an enclosure. Three arched openings give access to the court. The western part of this is occupied by the liwan which is five aisles deep. The cell containing the mihrab is a square much larger than the rest of the cells and has a domical ceiling. The eastern face of the liwan, that is the facade, has three arches, one in the centre, the other two flanking it. However, the three are not connected by any wall or screen and as such the facade is formed by a row of pillars and the three arches.

Early Mosques Plans:

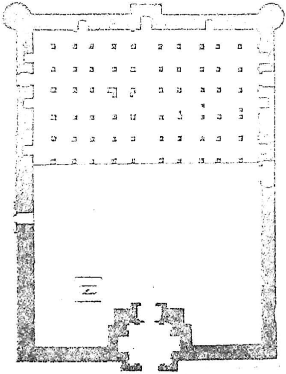
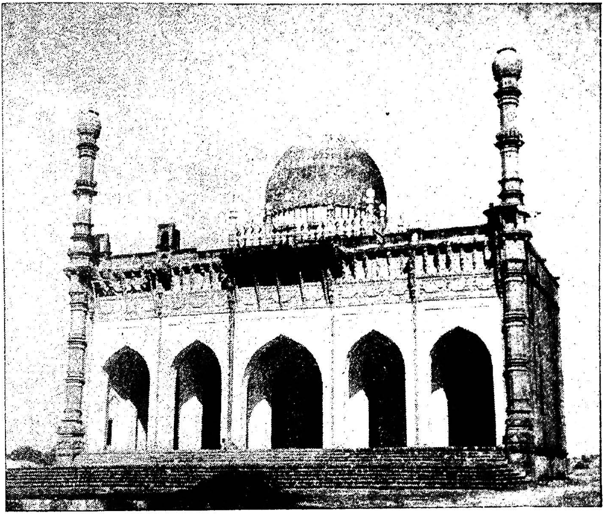


Fig. 8(a)

(a) Karim-ul-din's mosque, Bijapur.

After Cousens: BIJAPUR:

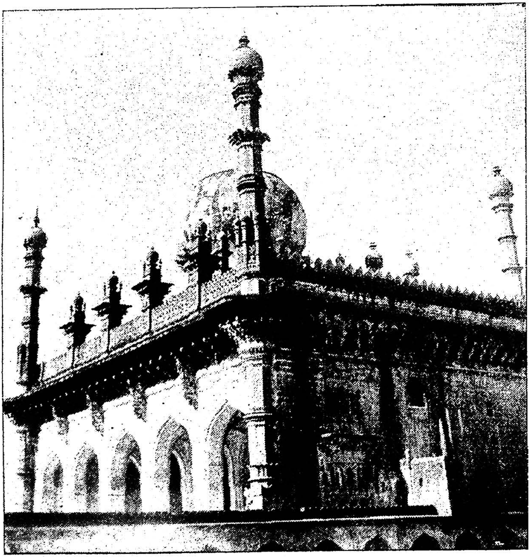


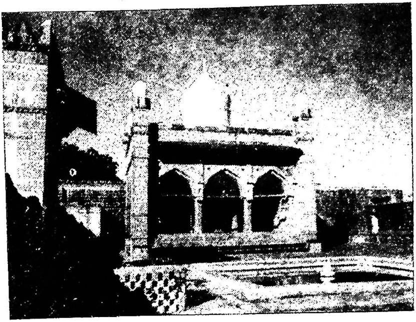
MOSQUE NEAR GOL GHUMAT, BIJAPUR

This structure shows a stage of the transition from the dome-dominated elevation to the minaret-dominated elevation. Here the contrast is not violent but certainly is the size of the dome lesser as compared to the other members.

MOSQUE IN THE IBRAHIM RAUZA : BIJAPUR

This is another instance where the dome is clearly losing its importance. In addition to the flanking minarets, smaller minarets distract the attention from the dome.

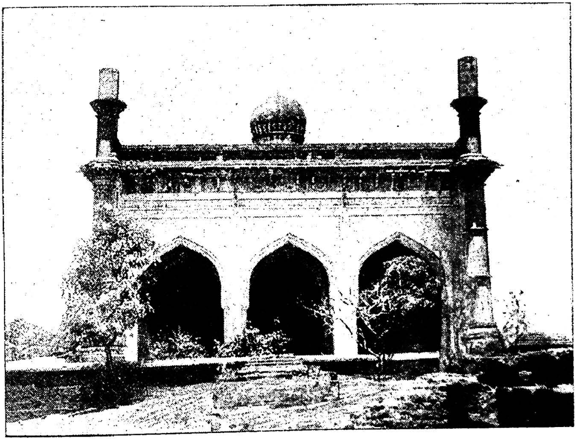




(a) Jami mosque; Jalna.

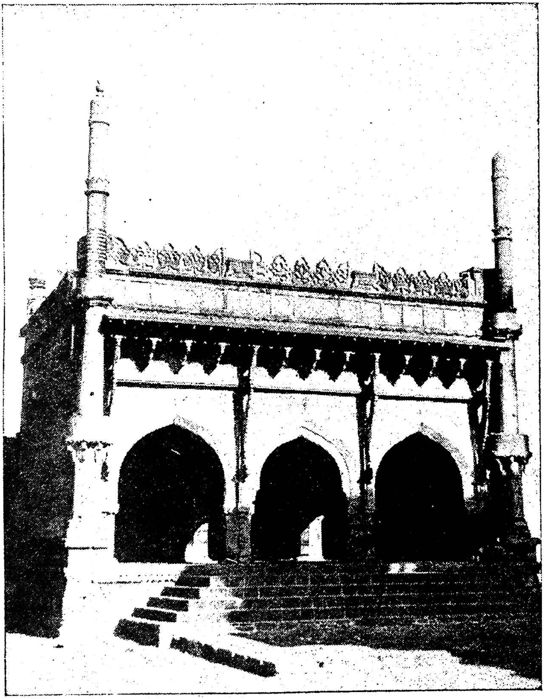
Both the structures illustrate the final stages of the elimination of the dome as a vital factor in the composition of a mosque facade.

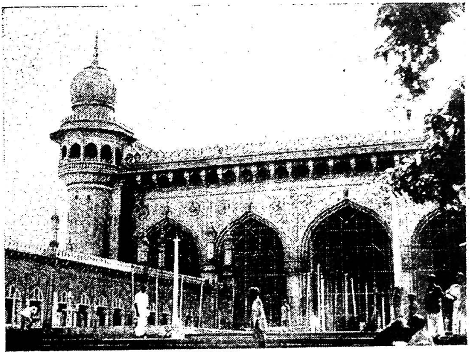
(b) Kali mosque; Bidar.



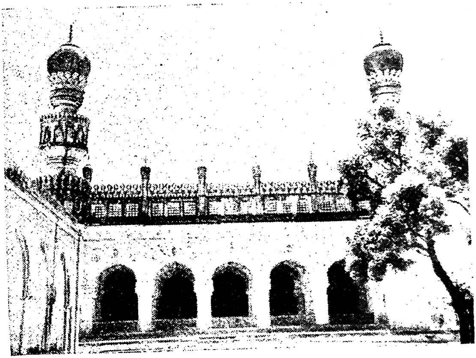
MOSQUE NEAR MIHTARI MAHAL, BIJAPUR

The dome has probably fallen off from the structure ! The journey from this to Golconda mosques is not far.



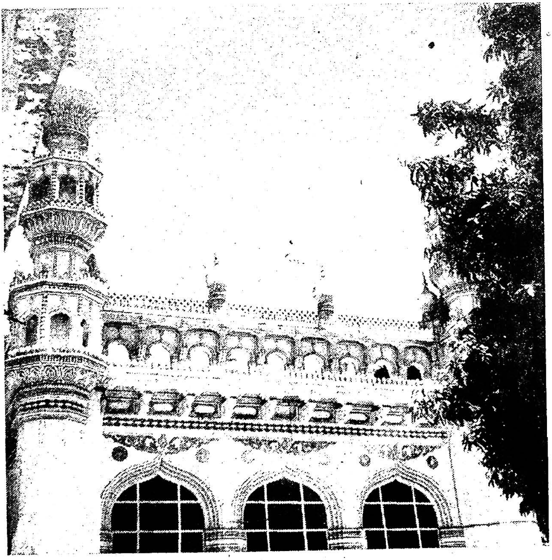


(a) Jami Mosque, Hyderabad



(b) Mosque near Qutb Shahi tombs, Golconda.

Here the dome has ceased to play any role in the elevation of the building.

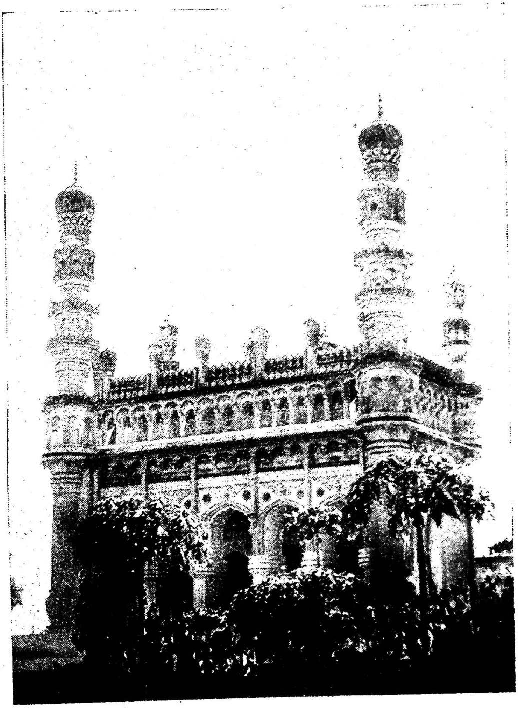


MOSQUE IN THE AFZALGANJ : HYDERABAD

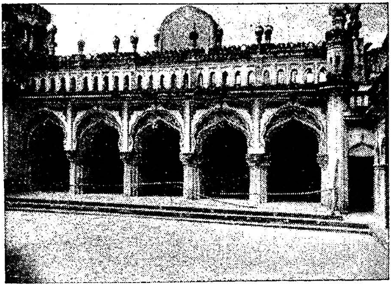
Note the near baroque stucco ornamentation of each and every component of the building.

TOLI MOSQUE, HYDERABAD

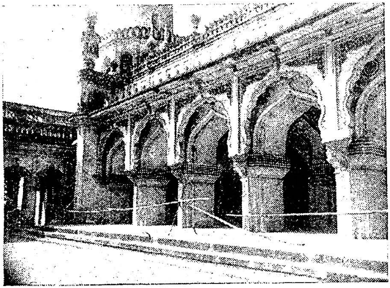
The final stage of the development of the mosque pattern. The dome is eclipsed and the minarets have assumed huge proportions.



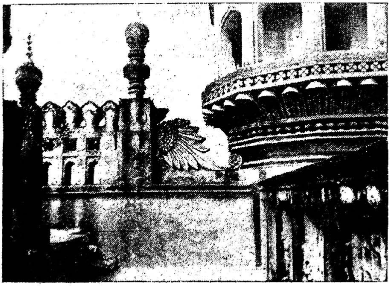
MOSQUE AND DETAILS OF CHAR MINAR
Hyderabad:



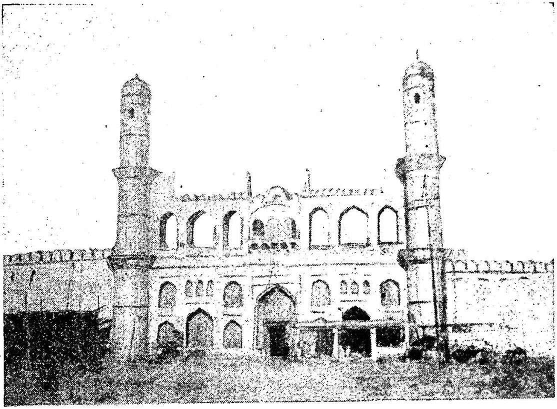
(a) Facade of the mosque.



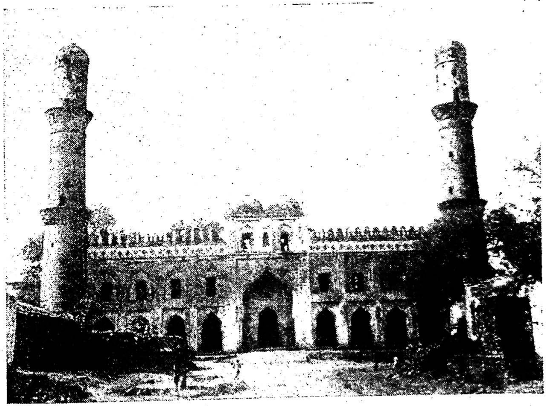
(b) A closer view of the arches. The cusped arch is a novel feature in Deccani architecture.



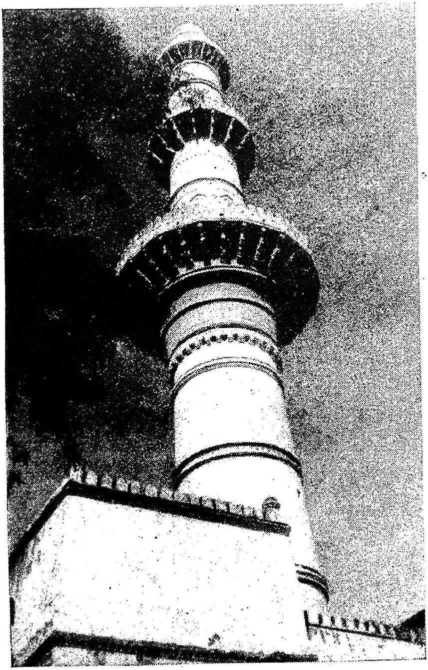
(c) Stucco lotus motif and ornamentation of the base of a balcony.

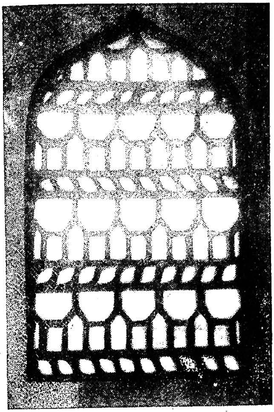


FACADES OF STRUCTURES AT GULBURGA
THAT WERE EITHER MOSQUES OR MADRASAS :

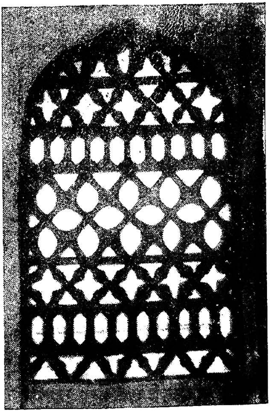


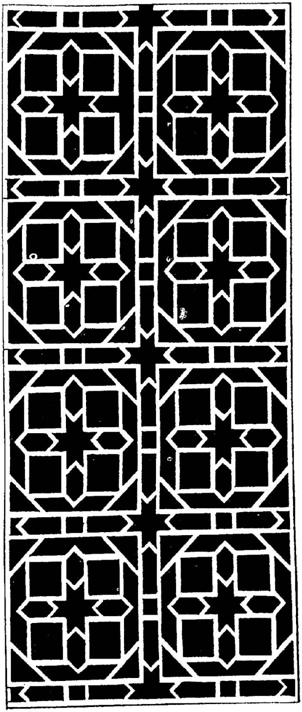
CHAND MINAR
DAULATABAD





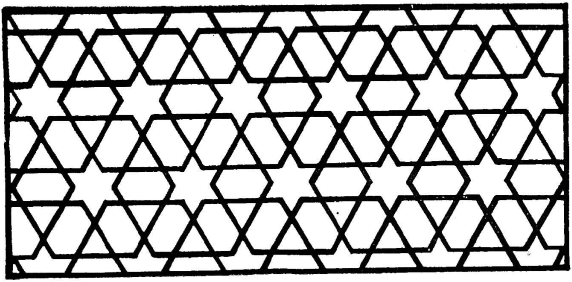
CHAND MINAR
HYDERABAD



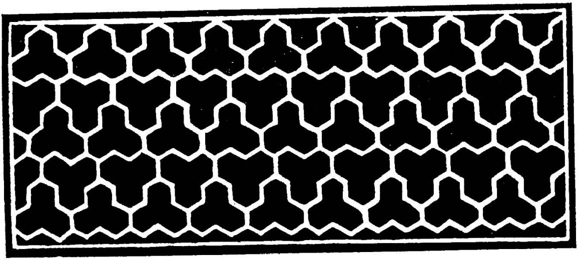


AURANGABAD

PATTERNS OF TRELLIS WORK



JALNA



JALNA

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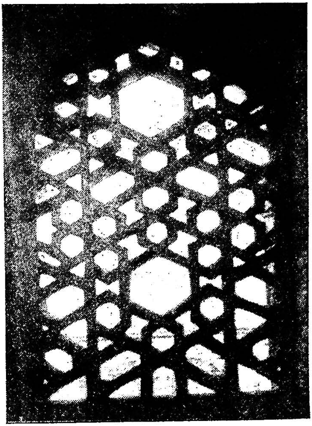
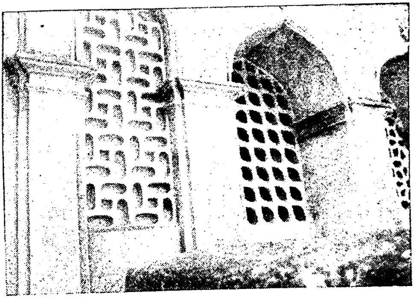
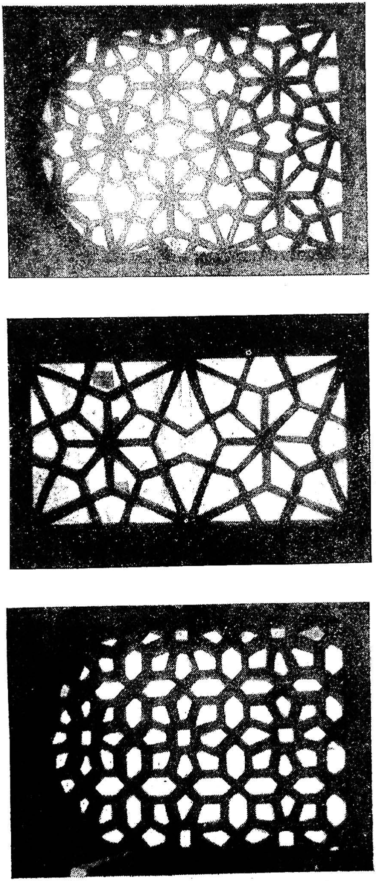


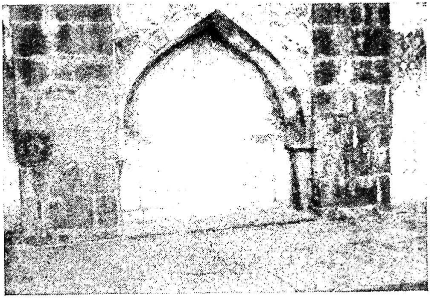


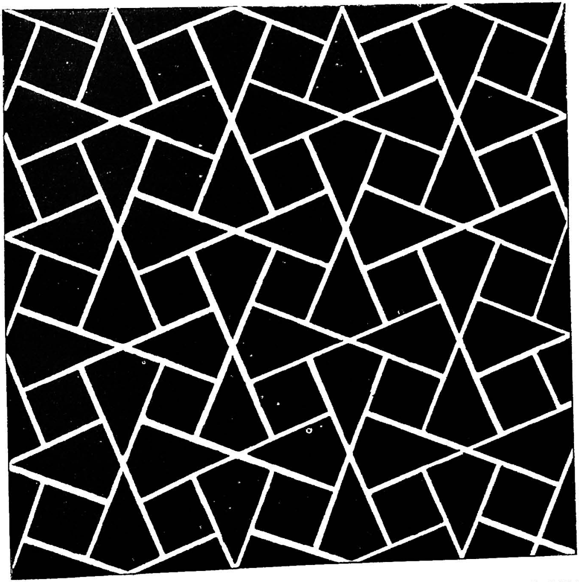
CHAND MINAR : HYDERABAD

PATTERNS OF TRELLIS WORK

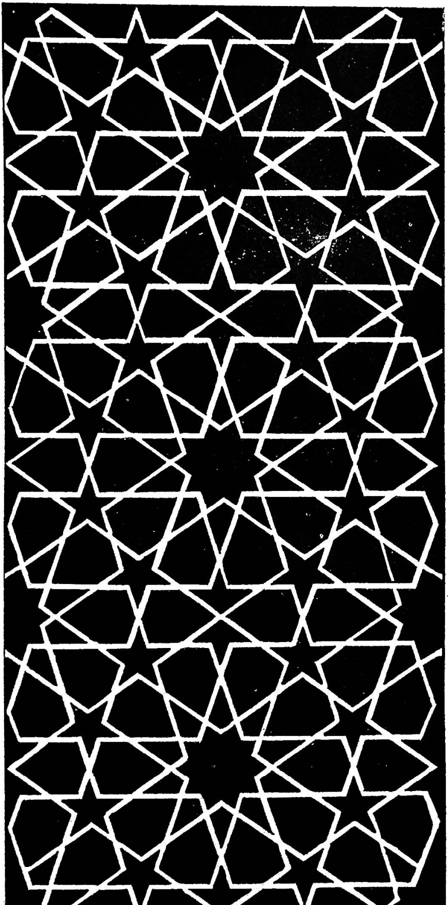


CHAR MINAR : HYDERABAD
PATTERNS OF TRELLIS WORK





PATTERNS OF TRELLIS WORK : JALNA



AURANGABAD

TRELLIS WORK DESIGN

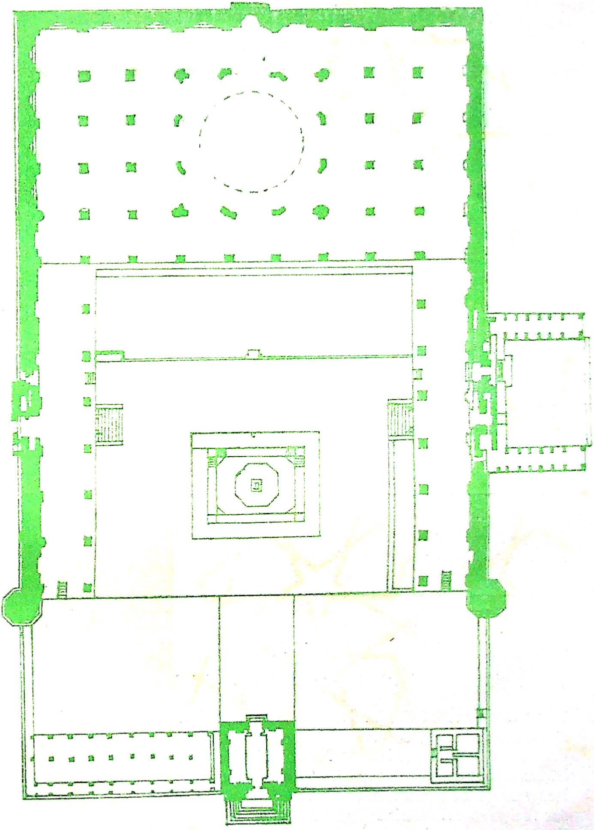


Fig. 8 (b)

(b) Jammi mosque, Bijapur.

After Cousens : *BIJAPUR* :

Later Mosque Plans:

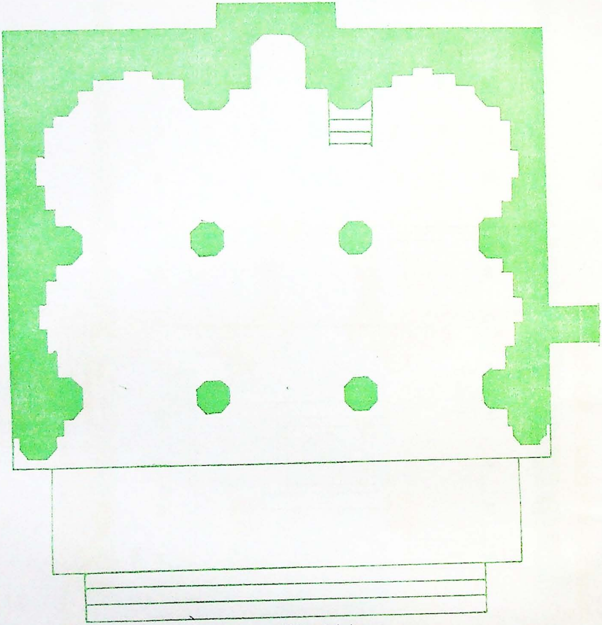


Fig. 9 (a)

(a) Mosque near Mihatari Mahal, Bijapur.

The pillars are of the Yadava or Hemadpanti order, and the entire construction is trabeate. Of a slightly later date is the Karim-ud-din's mosque at Bijapur. [Plate IX and Figure 8]. Built around 1320 its liwan measures 85′.66″ × 51′. The construction is trabeate and the pillars and other materials used for it are from Hindu temples demolished for the purpose. This mosque and the Jammi mosque at Daulatabad were the handiwork of persons obviously well-acquainted with the traditional mosque pattern. The sheltered liwan, the mihrab, mimbar, the open court-yard in front and the enclosing walls are all quite familiar parts

of a mosque structure. The addition of aisles around the court-yard and of minarets makes the scheme complete. Most of the important mosques, the Jammi mosques in particular, at all the chief centres in the area follow this pattern.

The most renowned departure from this set scheme is the Jammi mosque in the Gulburga fort. With all its innovations and aesthetic graces, this mosque remains a solitary exception to the general rule. So strong is the force of tradition that this bold and most original experiment failed utterly to influence in any manner the development of the mosque structures. [Plate X].

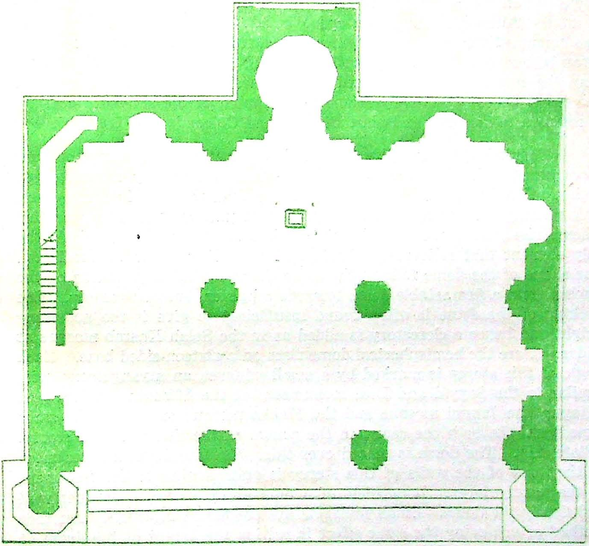


Fig. 9 (b)

(b) Kali masjid, Bidar.

After G. Yazdani : 'BIDAR'

As already stated, the plans of most of the important mosques in the Deccan conform to the traditional design. The liwan has in its front a spacious court-yard, usually surrounded by either walls or arched aisles. So also enlargement of the cell or chamber containing the mihrab was a common practice. This ground plan is followed only in a very few examples. A more typical Deccani mosque is much smaller. It consists only of a liwan and a small space in its front. The prayer hall is formed very often by two north-south and three east-west aisles. Sometimes the number is three and five respectively. This is probably a result of the need for economy both in money and space. Such economising led to the elimination of a number of features common to the larger mosques. The aisles enclosing the court-yard in front of the mosques were dispensed with. Although some open space is left in front of the mosque, it was comparatively smaller and no walls surrounded it. The size of the liwan is greatly reduced. The cell containing the mihrab is usually larger than the rest and is surmounted by a dome. This kind of plan which one comes across practically from the beginning of the sixteenth century is common to mosques at Bidar, Bijapur and Golconda. [Figure 9].

Turning from the plan to the elevation, three very common features are found. The facade of the liwan is formed by a number of arches. The central arch is slightly wider than the rest in some cases. This rectangular surface is surmounted by a parapet wall and over this scheme rises the dome. In the sixteenth century structures this is the only element that relieves the horizontal sprawling strain of the liwan. The shape of the dome follows the same chronological sequence as of the tombs; from a firm, stable dome towards a lighter, bulbous variety. The necking of the dome is often found insufficient to give it the necessary height and hence a clerestory is added as in the Solah Khamb mosque at Bidar. Here the hemispherical dome rises on a sixteen-sided base. Each angle of this storey is marked by a small minaret, an arrangement quite similar to the Sayyid and Lodi monuments of the fifteenth century. At Bijapur, the Jammi mosque and the Makka mosque have used the same expedient. In both the cases, in the centre of the liwan rises a storey. [Plate XI]. The dome is placed over this. The architectural treatment of the faces of the walls of this storey is quite similar to the treatment of the lower storey. It consists of a number of arches, a parapet wall and finally the dome. Small minarets are erected at intervals. Another method of achieving the same effect is raising the height of the drum of the dome. Several Bijapur structures like the mosques in Shahpur suburb display this feature.

The next stage is the lessening of the size of the dome along with a new emphasis on the minarets. The increase in the size of the minarets led to a lessening in the proportions of the dome. The outlines are bul-

bous. The best examples of such mosques are the Malika Jahan mosque [Plate XII] and the Bukhari mosque at Bijapur and the mosque near the tomb of Hazrat Makhdum Quadiri, [Plate XIII] at Bidar. In the Bijapur structures in addition to the two flanking minarets are added two more, above the piers bearing the arches. In the last and final phase as witnessed at Golconda, the central dome sinks into oblivion and the minarets dominate the elevation. These minars rise to great heights and have a clear taper upwards. However, the projecting balconies are so treated as to make them extremely heavy in aspect and the entire structure of the Qutb Shahi mosques becomes top heavy in appearance.

There are also to be found some fancy buildings. The mosque known as Langar-ki-masjid at Gulburga and the Ali Shahid Pir's mosque at Bijapur are roofed over by barrel vaults. The normal mode of roofing is by domes. Usually the mosque is divided into a number of cells and each is sealed by a dome. These domes are covered externally if a flat terrace is to be obtained. The Anda mosque at Bijapur is another one with an uncommon design. The mosque is two-storeyed. The upper one is exactly similar to the Malika Jahan mosque. The ground storey is square on plan. Its facade consists of a wide central arch and two on each side, one above the other. All are false arches and the only openings in the wall are a rectangular doorway and three-arched windows over it. No special aesthetic impression is created by the mosque.

The forcefully projecting cornices form a very important part of the facade along with the parapet crestings. The former i.e. the cornices, as pointed out in the section on design development, were borrowings from the contemporary Hindu structures. This feature helped to eliminate the vertical strain of the facade. In Hindu structures it was mainly used as a device of heightening the chiaroscuro. In the case of the mosque neither of these problems was present, for what the mosque facade required was a relief from the horizontal strain. Although basically the pronounced cornices have little role to play in the scheme of a mosque structure they enhance the effect of the building when seen from close quarters. And more so if the building is in stone. More often than not the cornices and the brackets supporting them have been superbly carved and are in themselves objects of no mean beauty. Their beauty as individual members is worth appreciation, inspite of their having no organic relation to the main design. Unlike the cornice the parapets are a feature irrevocably associated with the mosque pattern. In addition to the plain battlement type, numerous designs have been introduced. They are discussed under 'decoration', being a feature common to all Islamic buildings. The arches and blind arches used for mosques and practically all other structures in the various periods show very little change. The sizes of the arches may change but the shapes do so most infrequently. The first arch to be noted as a proto-type is the arch

of the entrance arch of the tomb of Hasan Bahmani at Gulburga. It can be described as stilted ogee. The inward sweep of the lines of the arch is confined to the upper one-third and it is more suggestive than real. The result is an extremely artistic intersection of the lines of the arch, the lines indeed meet and merge into each other than intersect. This feeling is kept constant throughout the period under study. The Jammi mosque at Gulburga has plain four centred arches and those used in the interior have a span slightly more in proportion to their heights. Certain features were introduced by the end of the Bidar period. One of them is the use of horizontal mouldings on the piers carrying the arches. These are introduced at the base of the arches. The mouldings are not quite unlike capitals on pillars, with a flat horizontal entablature on the top. This portion projected farthest from the line of the pillar and a moulding with a flaring section joined this to the vertical face of the pillar. Another feature was the use of a number of recesses in the arches like the door-frames of Hindu temples. In late Bijapur examples the cusped arch is used either independently or as the outer ring of the recessed arch. [Plates XI and XII].

The last notable characteristic of the later mosques is the design of the minarets. The minarets received prominence not only in their vertical aspect. Instead of standing on the roof of the mosque they now come to the ground. It projects from the walls and its base spreads over the ground covering an area greater in diameter than that of the tower it supports.

It is extremely interesting in this connection to note the Madrasa of Mahmud Gawan at Bidar. If its facade, a complete reconstruction of which is presented by Figures 10 and 11, is carefully scrutinized, the origin of the novel mosque design is most obvious. The top-heavy mosque having tall minarets with projecting balconies and the absence of the central dome are ideas inspired by the Persian architectural scheme of the Madrasa. Instead of the colour decoration the Deccani mosque uses floral carving in low relief or stucco ornamentation with the same motifs. Of this more later on. For the present it is sufficient to indicate the broad direction of the development of the mosque pattern.

MADRASA

[Madrasa of Mahmud Gawan, Bidar.]

The madrasa of Mahmud Gawan is a structure most uncommon in this part. There are records showing that madrasas were built at other places as well, but none is standing and none could compare architecturally with the one at Bidar. It is practically unique. And as is well-known the building is erected on a pattern commonly used in Western Asia. As such there is very little that can be added on the subject of its design or

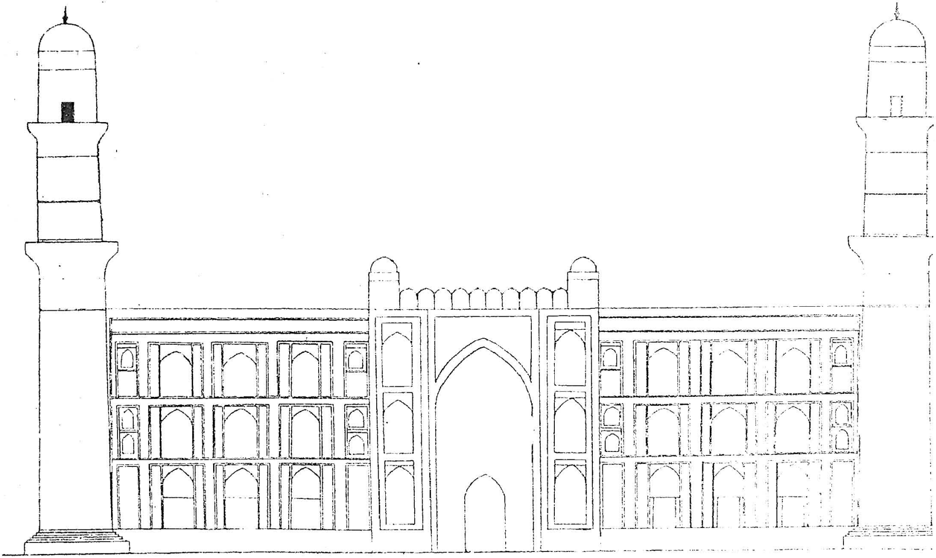


Fig. 10

Elevation of the Madrasa of Mahmud Gawan, a conjectural restoration.

its development. However, this structural pattern exercised influences in a number of directions and hence an analysis of its design is essential. Ideas and concepts, motifs and features, inspired by the Madrasa are found in many Deccani structures [Plates III and XXII].

The madrasa was erected in 1481 A.D. By this time the madrasa, both as an institution and as a structure, was fully developed. This was a college-cum-hostel-cum-prayer hall, meant to impart instruction mainly of a religious nature. The requirements of this college consisted of some lecture or assembly halls, a number of rooms to serve as lodgings to the students and faculty, and a mosque. The usual mode of the disposition of these was around a spacious court-yard. The madrasa at Bidar has a courtyard one hundred and three feet square. Around this, on all sides is a block of three-storeyed buildings, nearly sixty-five feet in height (including the parapets). In the centre of each wing is a giant vault, opening on the courtyard, and surmounted by a dome of comparatively smaller dimensions. The latter rises to a height of ninety feet from the ground level. The treatment of the walls, both externally and internally, was an essay in the arrangement of arches, small and large. Originally the surface of the front wall at least was treated with brilliantly coloured mosaics. Patterns of blue (turquoise), yellow and green glazed tiles covered the entire surface, except the parapet, which carried arabesque inscriptions. Today the building is denuded of this glorious applied ornamentation and it impresses the onlooker with its gigantic dimensions, but little beyond that. The arrangement of the components of the facade is tediously uniform and is a spectacle of unrelieved drabness.

A flat rectangular surface sprawling horizontally to the considerable extent of one hundred and seventy feet was relieved by a lofty arch in the centre and two soaring minarets, one on each side. The latter rose one hundred and thirty-one feet from the ground level. Besides these, three horizontal rows of arches, corresponding to so many storeys relieved the wall surface.

PERCY BROWN puts the whole criticism in a nutshell when he says : "As with all buildings of this order, its execution furnishes an admirable example of the inversion of the true principles of the building art, for, instead of the decoration being subordinate to the construction, it dominates it and what is produced is not primarily architecture but a background or framework provided by its builders for a display of applied art !"[6] However, except at Bidar, this mode of architectural ornamentation was scarcely used on Deccani buildings. It was substituted by low-relief cut plaster work, but the latter could not obviously compare with the lustrous colour schemes of the madrasa. At the same time the mad-

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[6] BROWN P., *Indian Architecture (Islamic)*, 75.

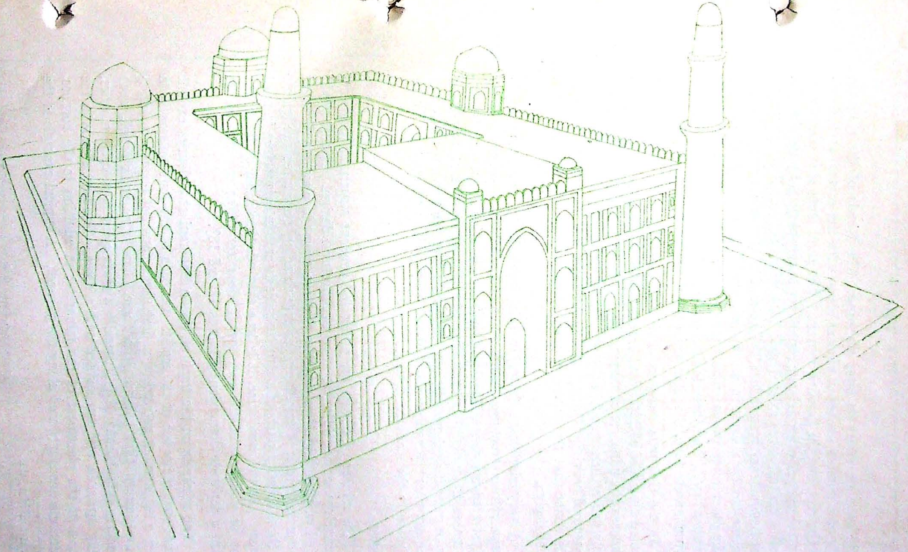


Fig. 11 *Perspective View of a Conjectural Reconstruction of the Madrasa of Mahmud Gawan : Bidar*

rasa did have its effect on later planning. The facade of the madrasa consists of a number arches of various sizes, with the central arch dominating the rest, and the flanking minars. The giant dome that rose above the central part of other Islamic structures is conspicuous by its absence. If at all a central dome existed as YAZDANI has suggested it must have been of insignificant proportions.[7] The roof of the gate was formed not by a dome but by a vault in all probability. This would be in keeping with the other three vaults and also the scheme of elevation as envisaged in this structure. And there is little doubt that the rectangular wall and the two minarets form the main elements of its design. (Figs. 10 & 11)

In the Golconda mosques of a later date the dome is altogether eliminated from the architectural design, while, not unlike the minars of the madrasa the minarets of these mosques rise to prominence. They are not only taller than would really go flush with the mosque heights, but have assumed heaviness through the strongly projecting balconies. There is little doubt that the source of inspiration of this new scheme is the madrasa design.

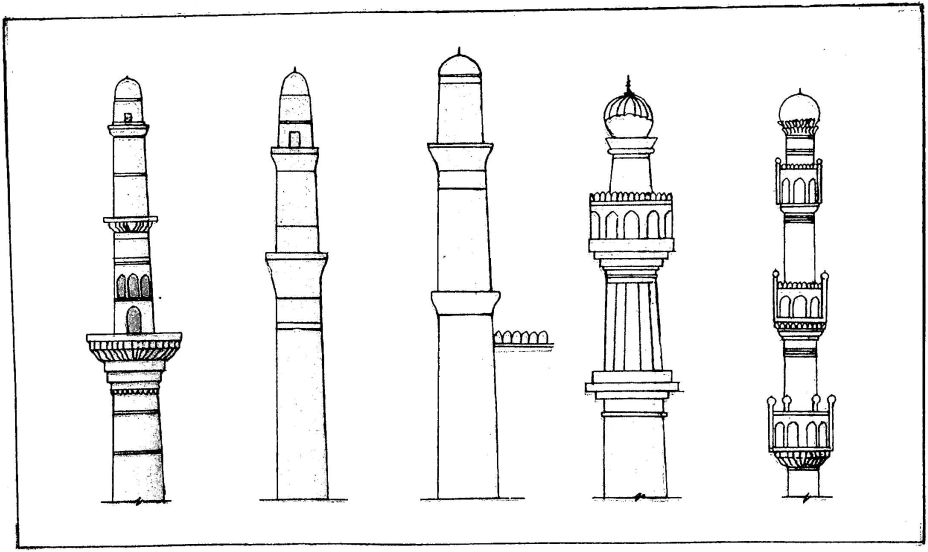
A very significant factor in this connection is the existence at Gulburga of two structures that were in all probability madrasas. They are illustrated on plate XXII and the front elevation shown in the pictures makes it amply clear that they were the prototypes of the newer trends in mosque designs. So also they go a long way towards supporting the argument advanced above that a very prominent dome had little or no place in the madrasa design.

MINARETS

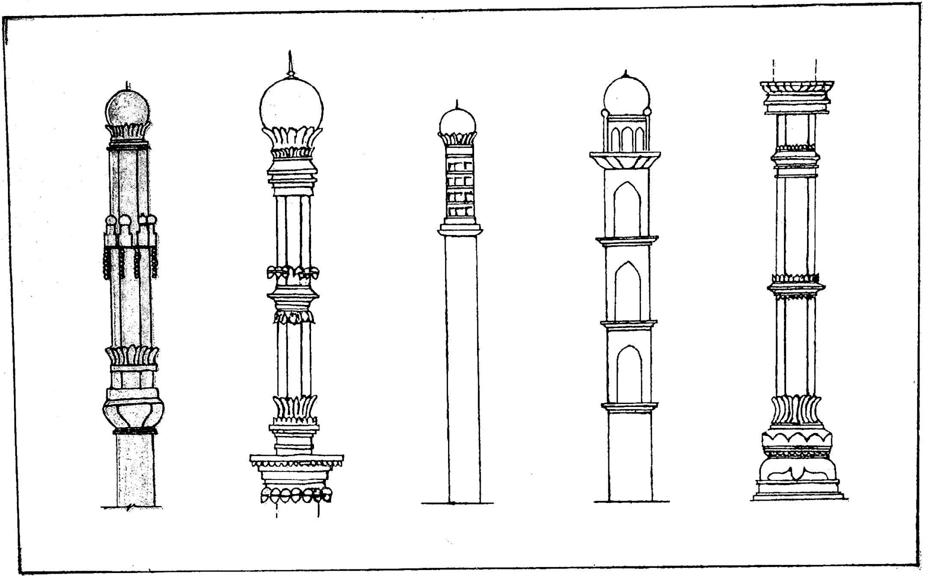
The minars or towers are either independent structures, complete by themselves, or are adjuncts of an architectural design. And it might be asked whether these two varieties that are meant to play two different roles can be discussed together; the free-standing structures are giants while those forming parts of a structure are dwarfs in comparison in most instances. At the same time, it is true that whether small or large, the scheme or planning of the two towers does not differ so much as to warrant a separate discussion [Figures 12 and 13].

The minarets on the tomb of Hasan Bahmani at Gulburga exhibit the most customary use of the motif. On each of the four corners is to be seen a minaret of extremely modest dimensions but enough to introduce an element that balances the dome. The minaret is fluted, each flute nearly cylindrical. It is generally a plain cylindrical column, often tapering upwards, and surmounted with a dome. The next step is in the direction of the placement of the minarets; in addition to the corners, the minarets are introduced along the parapet. A typical example is the

7 YAZDANI, *Bidar*, 94.



Chand Minar : Daulatabad. — *Madrasa of Gawan : Bidar* — *Gulburga* — *Hyderabad* — *Hyderabad*



Minarets : Bijapur

mosque in the Balekillah at Mudgal fort. On several tombs at Golconda the same treatment is seen. Later on there came about an elaboration in the design of the minarets. The square and octagonal plans are now adopted with an elevation with minature storeys. The introduction of several horizontal mouldings is sufficient to mark the different storeys. The height of the minaret increases considerably.

However, the most signal change in the conception of the minaret takes place, when the minaret no longer remains a motif or feature placed on or erected on the roof. Instead the minaret extends downwards and becomes a kind of buttress. Whether there was any structural need for such a buttress cannot be said. But the span of arches in the Deccani structures is not quite big, and this device of a corner buttress to counteract the outward thrust of the arches of the facade seems to be unnecessary. Whether out of some basic need or out of an adherence to a current fashion, one finds that the minaret now starts from the base of the structure and then submerges itself into its customary role on the roof. A very well-known structure utilising this scheme is the Madrasa of Mahmud Gawan at Bidar. Here the corner minarets are utilised in the grandest manner. It would not be far off the mark if it is suggested that either this structure itself or the artistic traditions which were responsible for its design were the inspiration for this novel design of the minaret. The traditions implied being those from Persia.

Once this motif was adopted, it was developed in two very distinct ways, one at Bijapur and the other at Golconda. If the Chand Minar at Daulatabad and the minars of the Madrasa are examined, it becomes obvious that this type of design has certain constituents which can be termed essentials. The tower is a structure with a circular plan and has a pronounced taper upwards. The vertical sweep is broken by three horizontal balconies in the case of the Chand minar and two in that of Madrasa minars. These balconies project forth considerably and thereby help to contrast the horizontal and vertical elements in a pleasant manner. The minars of the Madrasa were treated with mosaic tiles and in view of the plain walls of the Chand minar that structure might also have been similarly treated. Another remarkable feature of these minars is that in spite of their grand dimensions, they are extremely light in appearance. Seen from a distance this lightness impresses an onlooker as emphatically as the impression of sweeping height does from close quarters. In fact, the Chand minar seems to be floating in the air. The balconies do not in any way hinder this impression, although they project quite a good deal.

The Bijapur and Golconda minars are to be examined in the light of the above remarks regarding their proto-types. Those at Bijapur follow the example only to the extent of becoming buttresses. They are

not comparable for sizes, as the Bijapur minarets are quite small. Their bases or plinths are highly ornate. Various mouldings form layers of decreasing diameters to support the main column. Motifs like the legs of chairs or thrones decorate these pedestals. The minar is usually octagonal in Bijapur buildings. The upward element is punctuated by horizontal projecting mouldings reminiscent of balconies, but these are not balconies. Often these balcony motifs are highly ornate, decorated with minature minarets, stone chains, parapet jalies etc. In these structures, although the minarets have decidedly received more prominence, they do not dominate the scheme. They are confined to their traditional role of balancing the central dome.

The Golconda minars have gone headlong into the new experiment. They are attached to structures like mosques, but their dimensions are so vast as to deprive the other parts of the building their due share of importance. The towers generally have a taper upwards. The storeyed treatment is most emphatic. In most cases, the place of the open projecting balcony is taken by a covered one. This makes the balcony quite heavy looking. And in spite of the care taken to adopt diminishing dimensions for each upper balcony, the entire design is detrimental to the basic minar design. The tower that displayed such lightness and grace at Daulatabad assumes a top heavy aspect at Golconda. Consequently, the mosques of which these are parts gain the same top-heavy appearance. And as pointed out in the discussion on mosques, it is these towers that now occupy the dominant position of the building instead of the domes. There is a reversal of the role — so much so that at times one wonders whether the towers are for the mosque or *vice-versa*. This is not very surprising as even in other respects the Golconda structures display a tendency towards the baroque.

MANSIONS

To perceive any set design in civil architecture and to follow its development are tasks beset by an obstacle of the first magnitude. It is the difficulty of finding the structures in their original form. Most of the palaces and mansions of the Deccani rulers have collapsed with the passage of time. Matters are made worse by the fact that from time to time alterations and additions have been carried out by succeeding princes. Hence, even the plans — when and if they can be made out clearly — fail to reveal anything significant. Secondly, civil architecture is less likely to be governed by codes or traditions rooted in the religious beliefs of the people. In other words, the close similarity or even uniformity seen in the designs of mosques or tombs is not to be expected in the case of palaces or mansions. Some ideas of palace scheme can be still formed. There are certain factors which can be described as constants in domestic architecture. Palaces and hamamkhanas are the two main types of

buildings to be found. The latter is an essential adjunct of the former, but is a separate building. It usually consists of a number of square cells, with one or two of larger dimensions to serve the royalty. The baths have cistern-like depressions in the floors. A number of cells are usually screened. The hamamkhana at the Golconda fort is still in a good state of preservation. The palace commonly had a large open courtyard. There was a vast open hall on one of the sides of the courtyard. There were some rooms immediately adjoining the hall which served as the audience or darbar hall. Some of the chambers around this audience hall were screened off so as to house the female members of the royalty that chose to attend the darbar. The height of this hall generally amounted to two storeys. Some portion of this hall, adjacent to the back wall, was raised to serve as a seat for the monarch. The darbar hall on Golconda fort has such a seat, so also there was one in the Asar Mahal at Bijapur. In the palace at the foot of Golconda fort a balcony on the second storey opens out into a great hall that served as the court hall. More than one courtyard was not uncommon. In the centre of these courtyards small cisterns with fountains existed. In most palaces a part of the structure was raised to a height of more than four storeys. It seems seven was the standard number of floors, as many medieval mansions have been referred to as having seven storeys. A typical example of these mahals is the Sat Manzil at Bijapur. These structures were mainly luxury resorts where the king could retire with his favourites. There is very little doubt that in addition to these, other mahals common to medieval times, such as ranga-mahals, chitra-mahals etc. were in existence in the Deccani palaces. These and other rooms in the palace were grouped around the courtyards, care being taken to seclude the zanana apartments from the parts where access was comparatively easy.

In later times it became a fashion to erect independent large darbar halls or so-called pavilions. Perhaps the best specimen of this kind of a building was the Ashar Mahal at Bijapur that has recently collapsed, and the Anand Mahal at the same place. Its plan and the arrangement of the royal seat did not differ much from the darbar halls of the earlier palaces. Its facade was most remarkable. Four tall timber columns divided the otherwise open frontage into five compartments. The central of these was broader than the flanking. A large pond immediately in its front bestowed a grandeur and beauty very rarely to be come across.

Jalamandirs, small pavilions in the midst of or bordering on ponds were a common mode of luxury resorts.

The elevations were like other Islamic structures composed of a number of arches either blind or open. The treatment of surfaces does

not vary materially from that used on tombs or mosques, as is shown by the standing Bijapur or Bidar works. The shapes and sizes of arches were altered. The central arch was taller and broader, and panelling of arched niches resorted to. The dome or the minaret played very little role in the composition of the elevation. The needs satisfied by the domestic structure being numerous it was not easy to yield to a fixed pattern for the elevation. The later additions destroyed whatever semblance of balance or harmony the architect had striven to introduce. The possibilities of the organic element in the field of art being thus limited, the architect relied on applied modes of ornamentation for the artistic effect. More of it in the next section.

IV. DECORATION

PANELLING

The standard mode of surface decoration common to Islamic building practices was the division of the particular surface into a number of rectangular and square panels. The addition of arches to this panelling makes the scheme complete. How this method was applied to the exterior surfaces of tombs has already been discussed. The same method was most extensively used for the decoration of the wall faces of the interior. This panelling was usually the setting meant to receive either glazed-tiles or to serve as a base for paintings or cut plaster or stone carving work of the walls. Very little by way of originality could be exercised, beyond the alteration of the proportions of these features and the combinations of the panels and arches. But that was all. Very little scope existed for the individual artist. It is hence that wherever one goes a drab similarity, a monotonous repetition, meets the eye. Some typical instances of surface treatment are illustrated in figures 14 and 15.

To all these means of embellishing the appearance of a structure were added painting, glazed tile work, cut plaster work and sculpture in low relief. Let it be made clear that most of the methods described upto now were of a more permanent nature than painting etc. The latter are more delicate and fragile. As things stand, most of the buildings have been denuded of all colour ornamentation. Colour was largely employed. as is only to be expected, in the treatment of the walls of the domestic structures like the palaces and pavilions. Most of them have collapsed leaving no traces of any paintings behind. So also great buildings like the Madrasa of Mahmud Gawan that were once covered with tile-work are now devoid of any. Our appreciation of these means of decoration, therefore, necessarily depends upon the fragments preserved at various places. These fragments would no doubt give us some idea of the colour schemes or the motifs used. But they are minor details. And whatever remains does not afford us any glimpse into the general impression that colour created. First were panelled and niched walls, over them were paintings or stucco, their border bands, cufics and symmetrically arranged floral and geometric designs. This visualisation would be complete when one adds the dazzling colour schemes. However, with all this, the impression is still hazy, indistinct. This disappearance of painted schemes from the Deccani buildings is undoubtedly a great hindrance in their proper appreciation and evaluation. What is left is a mere skeleton devoid of flesh and blood. The appreciation based on skeletons is, let it be confessed, less than just.

Panelling of Wall Surfaces.

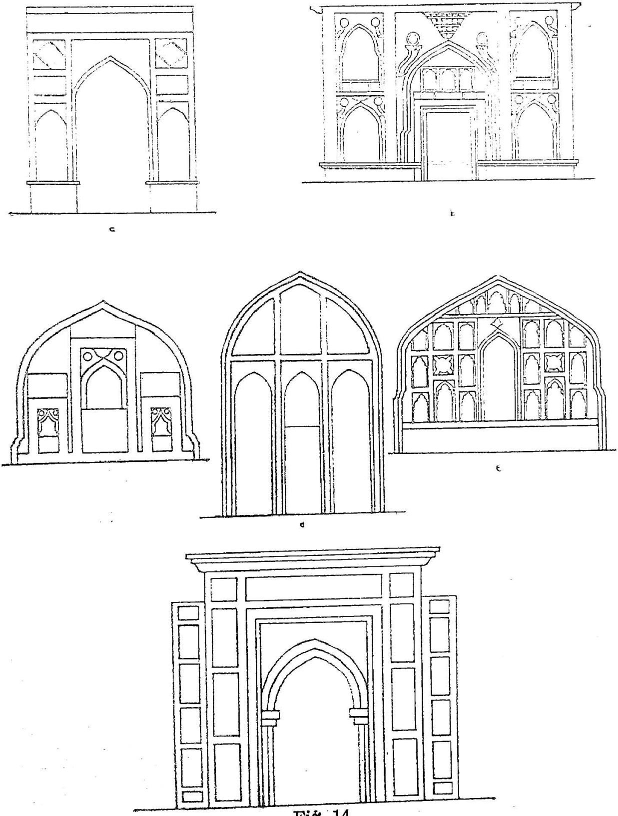


Fig. 14

(a) Chaukhandi of Hadrat Khalil Ullah, Bidar. (b) Anda mosque, Bijapur. (c) Sat Manzil, Bijapur. (d) Chotta Asar, Bijapur. (e) Hall on the first gateway to the tomb of Ali Barid, Bidar.

Panelling of Wall Surfaces.

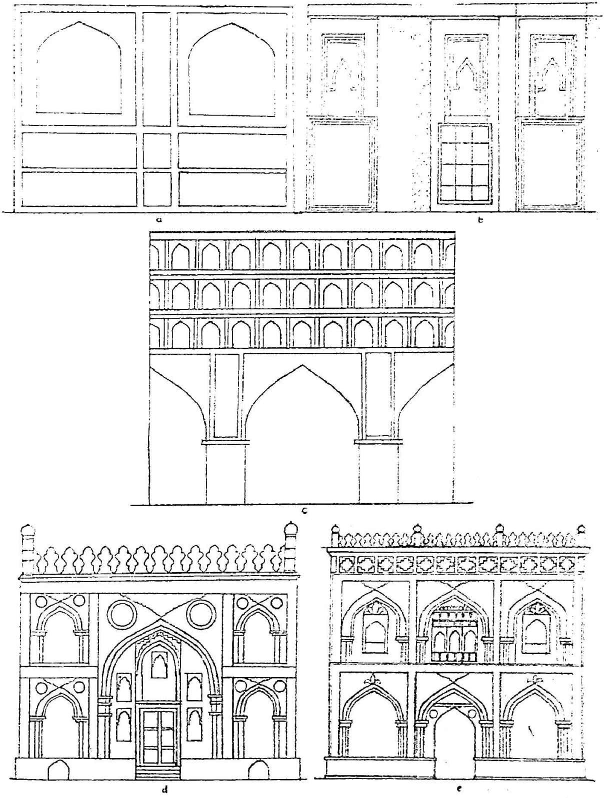


Fig. 15

(a) Rangin Mahal, Bidar. (b) Minister's room, Palace Bidar. (c) Tarkash-Mahal (?), Bidar. (d) Takht-i-Kirmani, Bidar. (e) Ali-Barid's tomb, southern gateway, Bidar.

The information about these modes of ornamentation can be briefly narrated as follows :

Mother of pearl work is to be found at Bidar only.

Painting : Wall surfaces were treated with paintings arranged to suit the groundwork of panels. The ceilings (domical) were painted. The squinches were also in some cases treated with coloured designs. The motifs used to be two main classes, arabesque and cufic inscriptions, and a great variety of floral and semi-geometric patterns. Crimson lake and white served as the ground, while foliations were in white or green. Flowers and buds were yellow or scarlet. Gold tint was used in several cases. [See Figures 16 and 17].

Glazed tiles : Polychrome glazed tiles covered walls in the same manner as paintings did. Although early structures like the Madrasa of Gawan at Bidar and the royal palaces at the same place were entirely covered with tiles, the extensive use of colour tiles was probably restricted to this particular place and also to this particular period. At other places the use was confined mainly to the parts of walls immediately above the door frames. The patterns used are not quite dissimilar to painted ones. In colour schemes the predominant colours are turquoise blue and yellow. Green, white and crimson play second fiddle to these two.

Cut Plaster or stucco work : Cut plaster work at its best is seen at Golconda. The beginnings of this kind of treatment were evident at Gulburga itself but the fullest development is seen at Golconda. The work is in low relief and barring some exotic items like the huge lotus bud on the parapet of the Char Minar at Hyderabad, the designs were traditional. They consist of geometric and floral motifs of which the latter predominate. The extrados of arches, the spandrels, and bands running parallel to but just below and above the cornices are parts commonly treated with stucco designs. In certain Hyderabad and Golconda mosques the entire wall faces have been decorated in extremely low relief work. The most popular motifs are the medallions on the tops of the arches, a tusk-like support they have, and the flower that rests on the point of the arch.

Stone carving : The position occupied by stone sculpture in Deccani architecture is minor. Brackets and cornices, mouldings on minarets etc. have been already referred to. And it must be mentioned that the craftsmanship of these is of a high order. What remains is a reference to stone work at Bijapur, and its parallels in the stucco work on Golconda mosques. The extrados, spandrels have received their due share of attention, but surfaces of cornices facing downwards have also been carved. Medallions and stone chains on some Bijapur structures are well carved. At other centres stone work is conspicuous by its absence. The illustrations on figures 20, 21, 22 and plate XXI give a better idea of the ornamental

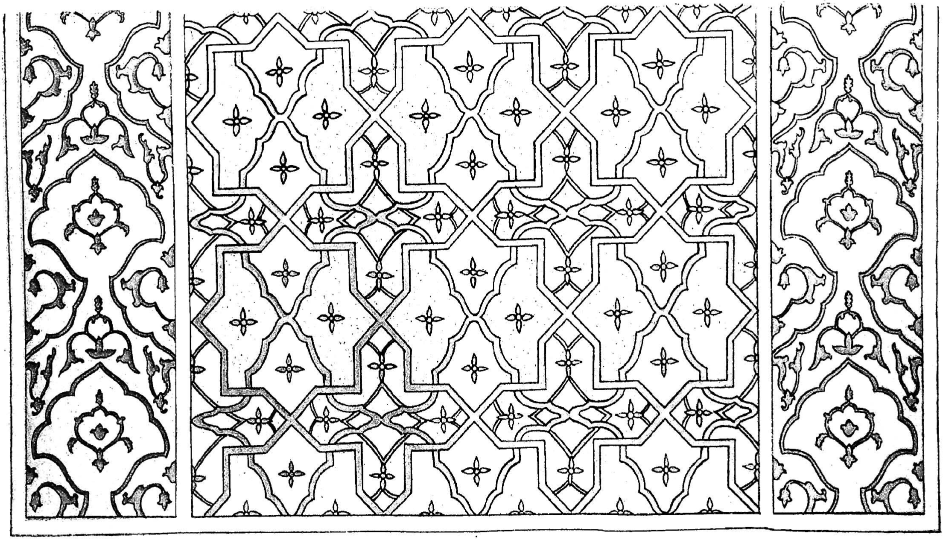
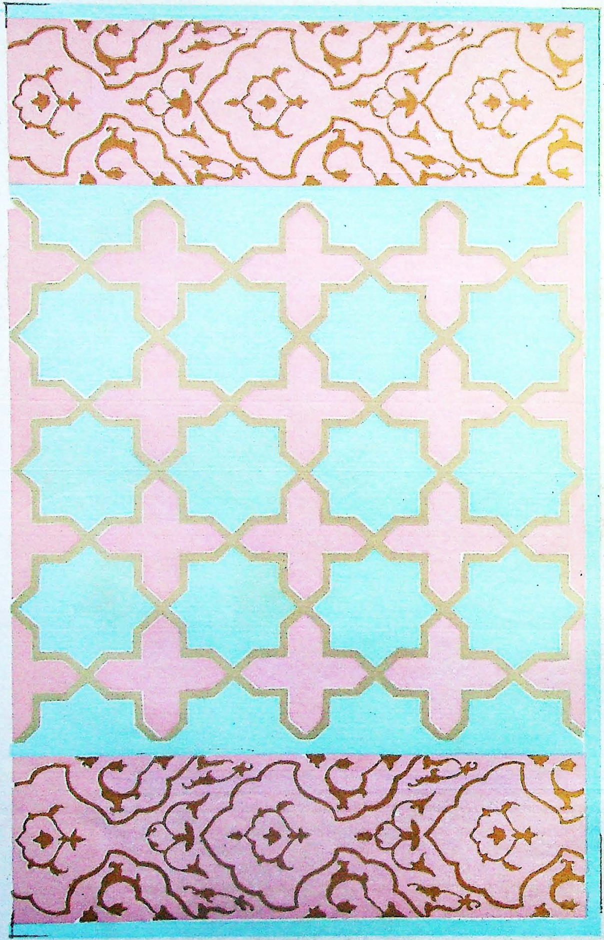


Fig. 16

Portions of Colour Decoration : Ibrahim Rauza — Tomb — Bijapur.

By the permission of the Department of Archaeology.



aspects of the Islamic buildings under discussion than words can do. But words would make evident certain factors regarding them which might otherwise go unnoticed. While considering design development it has already been pointed out that the architects adhered to certain concepts and methods of architectural planning. For construction the Moslem has a predilection towards the arch and dome, for planning of buildings a preference for two-dimensional and for ornamentation the choice falls on applied rather than organic. The ornamentation aims at the beautification of the structure. This can be achieved in two ways. A building can be erected in a manner that would make it good-looking without embellishment of any sort. This is to a certain extent achieved by the shapes of the domes and the arches in Islamic structures. The other mode is application of ornamental elements from the outside. There is no doubt that this calls for certain adjustments in the structural aspects so as to be better suited to receive the applications. Amongst the applied modes, colour is the only one which goes absolutely flush with two-dimensional planning. And that is the method most widely utilised in Islamic architecture in general and the Deccani architecture in particular. Cut plaster and sculpture works in extremely low relief are the subsidiary modes used. Out of these, as stated above, colour has faded obstructing thereby our appreciation of the structures. Stucco and low-relief work in stone look quite good when looked at from close quarters, but alter very little the general appearance of the entire building concerned.

As to the sources from which the newer trends seen in Deccani architecture emanate, it has been often shown that glazed tile-work was inherited from Persia, while the stone work comes from the local temple building traditions. One has to be very careful when attributing items and determining sources. There is very little question about the Persian influence. When it comes to indigenous influences, it is a different story. Similarities exist between the features like brackets, cornices, and mouldings on Moslem buildings and the Hindu temples of the area. But that is as far as one can go. Only independent items that could be adjusted or so altered as to suit Islamic planning were accepted. There did not come about any change in the ideas that governed the overall planning of the buildings. The architecture of the Deccan, in spite of the obviously Hindu features just mentioned, remained to the last true to Islamic concepts of beauty.

ARCHES

Arches used for the various buildings have already been referred to in the section on 'design development' while dealing with mosques. The typical arch that was introduced into the Deccan can be called 'ogee'. This particular outline remains constant throughout the life-span of Deccani architecture. There indeed are slight variations in the shapes of the arches, but these variations are such that they could be appreciated

Shapes of Arches.

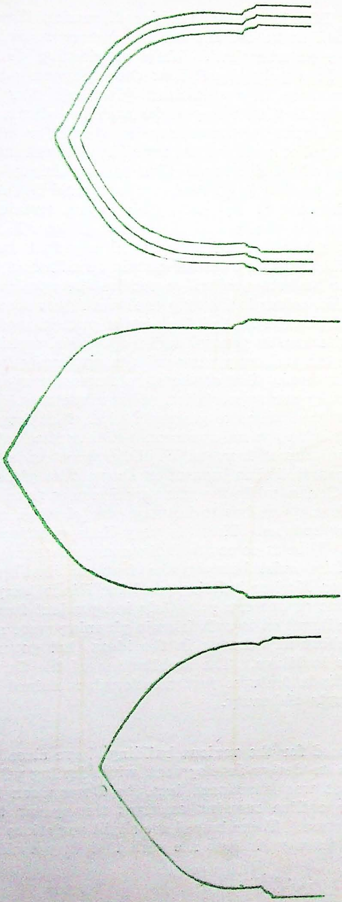
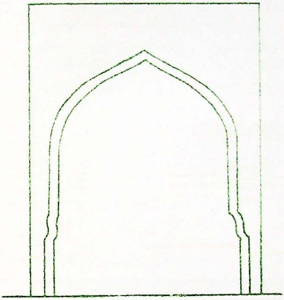
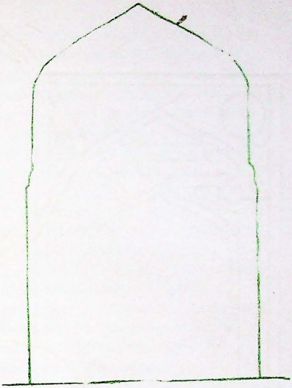


Fig. 18 (a)

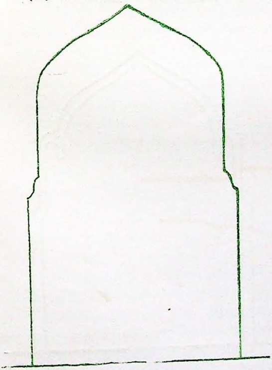
(i) Jammi mosque, Gulburga. (ii) Jammi mosque, Bidar. (iii) Tomb of Ali Barid, Bidar.



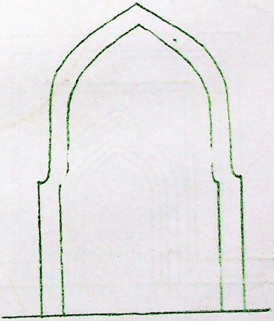
(iv) Haidariah mosque, Bijapur.



(v) Mosque near Golconda Tombs.

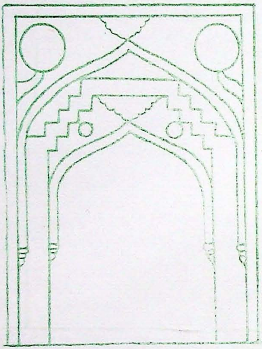


(vi) Jammi mosque, Gulburga.

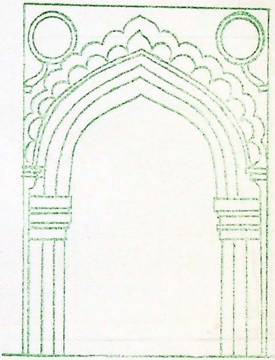


(vii) Royal Chamber, Bidar.

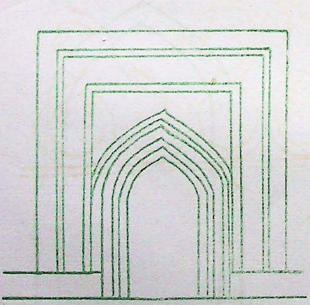
Fig. 18 (b)
Shapes of Arches.



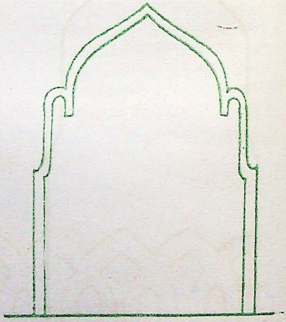
(i) Ikhlas Khan Mosque, Bijapur.



(ii) Ali Shahid Pir's mosque, Bijapur.



(iii) Mihatari Mahal, Bijapur.



(iv) Langur Ki Masjid, Gulburga.

Fig. 19

Shapes of Arches.

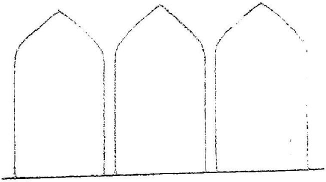
by the eye but would not affect the above definition when it comes to description in words. In earlier stages the piers were not marked off very prominently, were not distinguished from the general line of the arch. The Bidar period saw the introduction of horizontal mouldings to mark the junction of the pier and the arch. These were nothing more than slightly projecting bands like the 'kani'-mouldings in the beginning. As time went on, however, greater elaboration was effected in these mouldings. At both Golconda and Bijapur are three to four bands visible, each bearing sculptured or stucco designs in relief. Another change is that instead of broad arches with low imposts, the most notable example of which is the arches of the Jammi mosque at Gulburga, the arches became taller and narrower. This tendency is most obvious in the Golconda buildings. The device of recessed arches came into vogue in the Bidar period. This might be an innovation adopted from Hindu recessed door frames. Two or three plain recesses form the usual pattern. In some cases one of the arches is a cusped arch. In others a beaded string-course runs along with the arch. This is a motif extremely popular at Golconda. A very good-looking example employing both these methods is seen at Bijapur in the Ali Shahid Pir's mosque. The mosque of Ikhlas Khan, the Anda mosque, and some other buildings at Bijapur and some at Bidar like the gateways to various tombs have utilised a combination of arches and door-frames in relief. The Langar-ki-masjid at Gulburga has a very queer pendentive-like member in its arch. If the entire trend of these developments is examined, it becomes clear that the architect is struggling hard to get out of the set arch patterns handed down to him traditionally. In his endeavour to escape from the monotony inherent in the arch-patterns he has sought refuge in certain expedients utilised in Hindu temples. These are none other than the mouldings that create light and shade patterns which relieve the flat surfaces [Figure 20].

PARAPET

The parapet wall was originally a utilitarian feature. It was in early West Asian architecture meant to shield the warriors on fort walls. However, in due course it achieved a place in the architectural scheme, not because of that reason, but because it helped to add to the appearance of the structure. This change came about because of the necessity to break the even flow of the horizontal line of the top of the structure. The purpose could be better served by crestings of various shapes. The most elementary cresting is one with a 'pointed-arch' top as shown in Fig. 1 below. Another variety that can be described as basic is the 'lotus-bud' or 'cup' design. This is widely used for religious and civil buildings. The most elementary shape is seen on the Solah Khamb mosque at Bidar. It is illustrated in fig. 2. These two have served as the proto-types of all future designs. Other shapes that become popular at Bidar, Bijapur and Golconda are discussed below. In the later examples one notices a very

remarkable change. The parapets of type 1 were massive, their thickness and size (often 5 feet in height) made them heavy looking. The slanting embrasures made them look grim. The later examples in contrast are very light. They no longer remain walls but become pieces of trellis work. This is done, no doubt, to accelerate the effect of the skyline. In addition to stone, brick is also employed to erect the parapet walls and here instead of the perforated designs, we have stucco designs in relief. Some varieties are described below.

These are the most commonplace battlement crestings found on medieval Islamic structures. The early buildings of the Bahmanis such as the tomb of Ala-ud-Din Bahman Shah at Gulburga, display the same design.



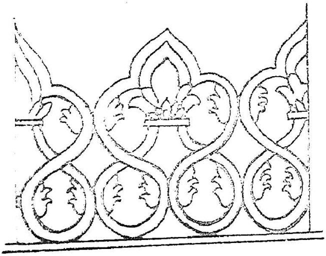
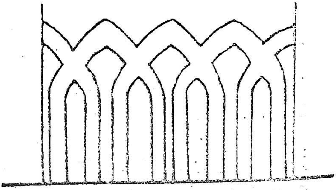


Figure 2 shows the 'lotus-bud' or 'cup-shaped' motif. This along with the one shown in Fig. 1 was the prototype of later crestings. Its numerous varieties are seen on Deccani buildings. Bijapur.

This type of parapet was obtained by overlapping forms of the shape of Figure 1. However, instead of being solid, this parapet is as good as trellis work. Bidar.



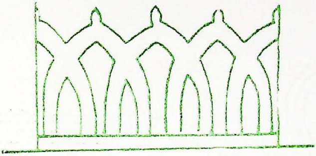
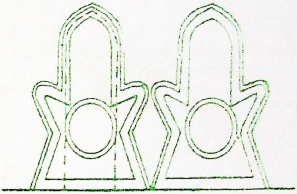


Figure 4 shows the same method as figure 3, but has made the additions of small spherical finials on every point. Secondly, the corners assume curvatures instead of the angular ones of the former design. Bijapur.

These crestings are quite akin to number 1. Their bases are extended to give slanting sides upto one-half their height, and over this, shoulders project. Their tops are rounded. Bijapur.



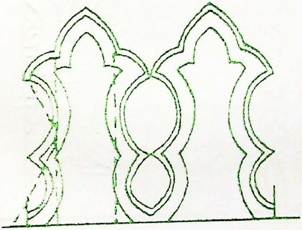
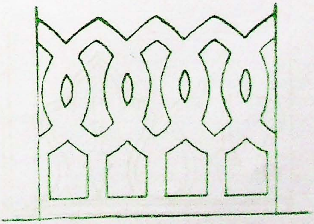


Figure 6 is to some extent a combination of the crestings in figure 1 and the shoulder motif of figure 5. It can be also derived from the design of number two. Both these combinations are explained in the figure. Bijapur.

Figure seven depicts crestings which are based on number one. Only their sides are turned in at the base and the forms overlap as in number three. Bijapur.



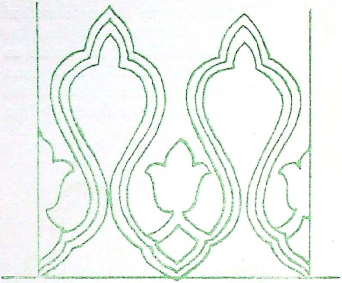
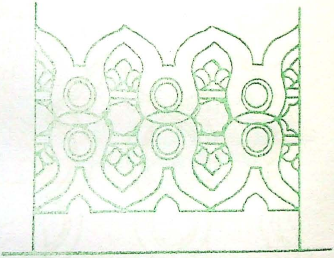
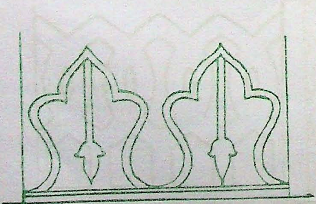


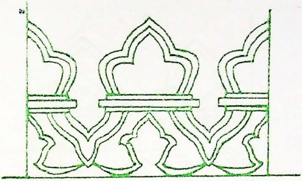
Figure eight shows a slightly elaborated form of crestings illustrated in figure two. Small trefoil flower motifs are introduced in between the crestings. Bijapur.



This a very fine although a bit complicated version of the cup motif. In addition to the lateral repetition of the motif one sees here the vertical repetition of the entire parapet wall. Bijapur.

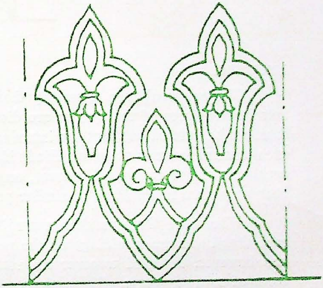


Here it will be noted, the shapes of the crestings and the empty space in between are not similar to each other. This is a version of number five with all angles substituted by curved lines. Bijapur.



This is an ornate development of number ten. Horizontal waist-bands and miniature bud-designs in cut plaster are introduced. Bijapur.

Figure 12 is an elaborated version of 2. Bijapur.



Number 13 is also one more example of the highly ornate varieties of number 2 that were used in the Deccan structures. Bijapur.

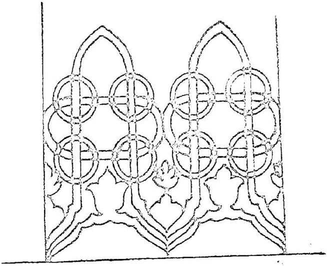
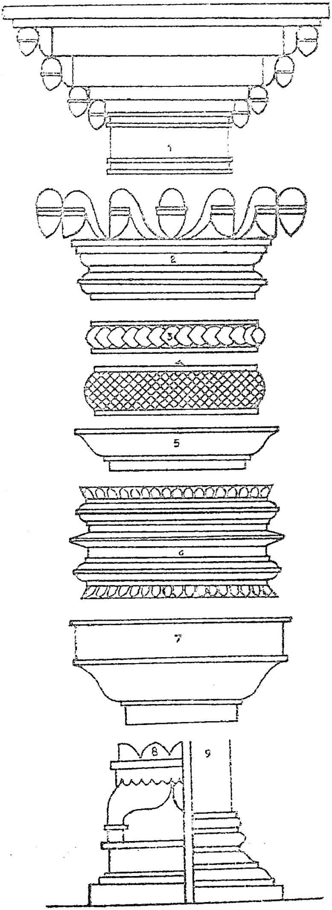


Figure 14 depicts a cresting which was woven round the skeleton of the ordinary battlement motif, with various circles, oblongs and bud motifs, to turn it into quite a motifs, to turn it into quite a good-looking trellis design.
Bijapur.

MOULDINGS

Various mouldings, especially those that were used for the minarets in structures of the Deccan are discussed here. In this connection it might be pointed out that the introduction of horizontal mouldings in architectural ornamentation is a Hindu idea or practice adopted by Islamic architects of the region. Moreover, certain designs of these mouldings bear very close resemblance to similar parts of Hindu temples.

Where are these mouldings used? Starting from the base, it is seen that there are mouldings on the pedestals of the minarets. These are, however, extended to cover the entire mosque facade and take the form of so many steps. These steps, plain though they are, do add to the light and shade pattern and keep harmony with minaret pedestals thereby giving the entire structure the illusion of an extended and firmer base. The mouldings at the base of minarets are of two distinct varieties, one as at Bijapur and the other as at Golconda. The former are directly derived from Hindu temples while the latter from the Persian design of the minarets of the Madrasa of Mahmud Gawan at Bidar. Those at Bijapur have a four-legged table-like pedestal. The legs are reminiscent of the curved 'simhasana' supports and the space in between is filled in by various floral patterns. This is often used in combination with a rectangular block-like member that is quite similar to the base of temple pillars. The pedestal of the minaret as found at Golconda is like an inverted lotus flower. The incised ornament used is also petal-like. To add to its effect roll and 'kani' mouldings or string-courses in stucco are utilised. In certain buildings stucco work in relief is applied on the minarets. The next important part that received attention is the balcony projection on minarets. The minarets at Bijapur, although highly ornate, are smaller in size as compared to that of Golconda. And unlike the



(1) Mosque near Ibrahim Rauza, Bijapur.

(2) Ibrahim Rauza Mosque, Bijapur.

(3) Qutb Shahi Mosque, near Golconda tombs.

(4) Qutb Shahi Mosque, near Golconda tombs.

(5) Qutb Shahi Mosque, near Golconda tombs.

(6) Ibrahim Rauza Mosque, Bijapur.

(7) Qutb Shahi Mosque, near Golconda tombs.

(8) Nagar-Khana, Gol Ghumat, Bijapur.

(9) Mushirabad Mosque, Hyderabad.

Fig. 20

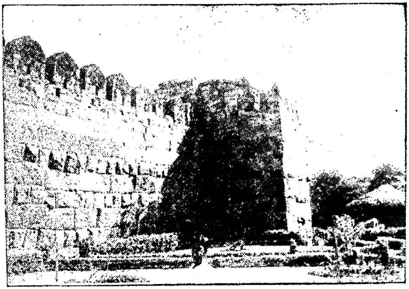
Mouldings on Minarets.

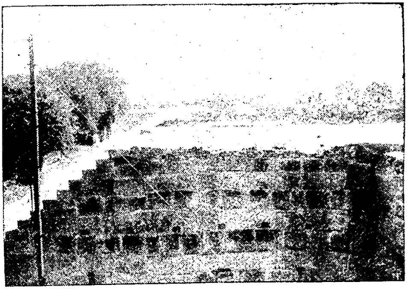
latter place, most of them do not have any projecting balconies. Wherever they have these balconies, stalactite bracketing is resorted to. The emphasis laid on the balconies at Golconda is given in certain instances to the part marking the end of one storey and the beginning of another at Bijapur. Here, the pedestal design is repeated. At Golconda the projection of the balcony is ornamented with a conventional petal design. The section of this moulding is flaring (fig. 20). This sort of a flaring band is preceded by two or three stucco bands. They are formed of a kind of string-course, and a wreath motif. There also occurs a beaded band on some minarets. There are no horizontal mouldings on Golconda minarets other than the ones at the base, those immediately below and above the balconies and the one below the domes. As far as the vertical aspect goes, the minarets were sometimes octagonal on plan. At Bijapur and also to a certain extent in late Bidar buildings, the horizontal mouldings are employed in their proper role. They are so placed as to break the vertical strain that the slim and slender minaret creates. The most commonplace band used for this purpose is the 'kani' motif. Next to it comes a flower like band with flaring section. Lastly comes the most artistic variety. This is a minature cornice with the typical 'S' shaped brackets. To their ends are fixed bud-shaped pendants. The effect of these mouldings is singularly pleasing.

Apart from these, which are mouldings in the strict sense of the term, there are certain other features that are not far removed from them either in purpose or in execution. They are the various types of recessed arches, the cornices, the pillars and pilasters on the corners etc. However, as they are discussed separately, only a mention would be sufficient here. All these devices are employed for the purpose of relieving the plain surfaces of buildings through the medium of chiaroscuro.

TRELLIS-WORK

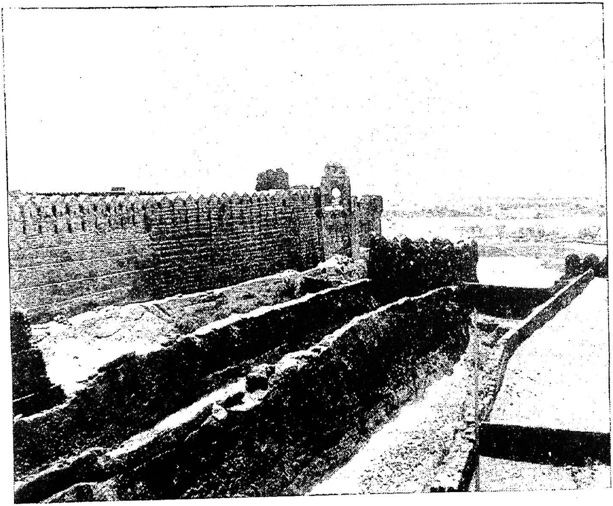
Perforated stone screens or 'jalis' have been used in a number of structures. It is certain that we have lost some good specimens, when the domestic structures crumbled during all these years. There was more scope for the use of this artistic device in domestic architecture. There were various partitions and screens, the balconies and windows of the houses, especially of the ladies' quarters that required screens and there was no method of doing this in a manner as pleasing and as useful as the trellis work in stone. In addition to stone, in several Deccan structures are seen jalis cast in stucco. At Golconda and Hyderabad there are a number of buildings that have utilised these stucco jalis. Of whichever material the screens are, their patterns and designs are the same. The illustrations in the following few pages show some good examples from the towns of Bijapur, Hyderabad and Jalana. It would be immediately obvious that the constructions of most of these jalis are geometric. Cer-





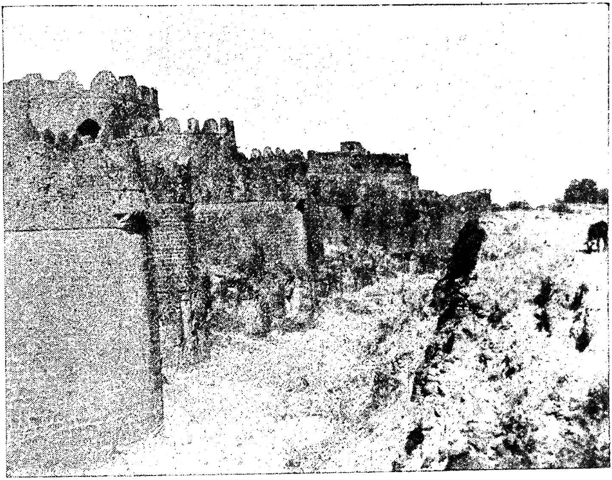
The two photographs give some idea of the pre-Islamic fortifications in the Deccan. The parapet crestings are Islamic but the heavy block dry masonry construction of Hindu military architecture is clearly seen as also the angular bastions typical of that class. The lower picture shows the parapets from inside the ramparts, note the flight of steps that continue all along the length of the walls.

FORT WARANGAL



This is an excellent view of the triple moats and the strong fortifications of the fort at Bidar. It is to be noted that the moat was cut mostly in rock as is evident from the dividing partition walls that are cut in the rock.

TRIPLE MOATS : FORT BIDAR



This is the Gulburga fort. Very clearly visible are the broad ditch that encircles the fortified area, and the double lines of ramparts. Here as at Bidar the walls stand on a solid foundation of rocks through which the moat is cut.

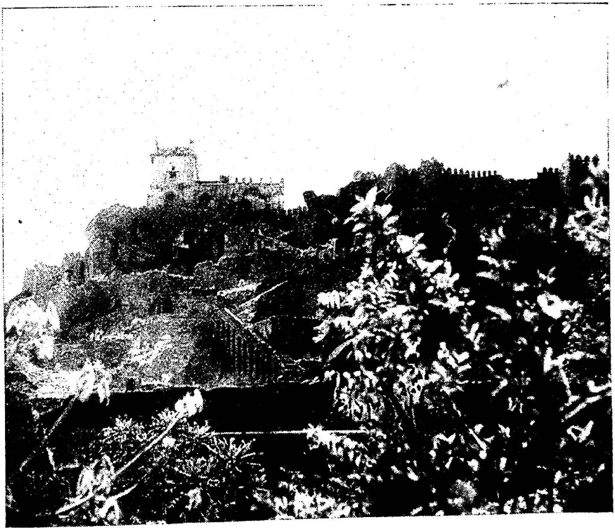
DITCH AND RAMPARTS : FORT GULBURGA

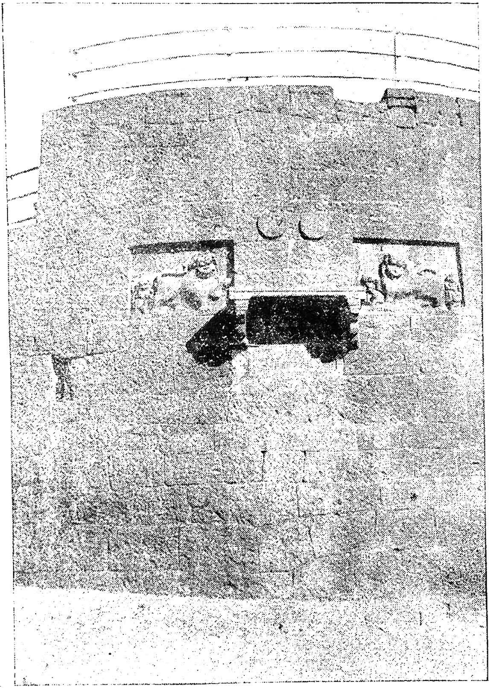
A view of the defensive outworks and ruined moat of the Golconda fort from one of the towers. The moat is to a large extent filled up now, but enough remains to show clearly the glacis (marked A) and the perpendicular wall retaining it (marked B). The figure on page 82 showing a section of the glacis, moat and ramparts would make the idea clearer.

DEFENSIVE OUTWORKS
FORT GOLCONDA

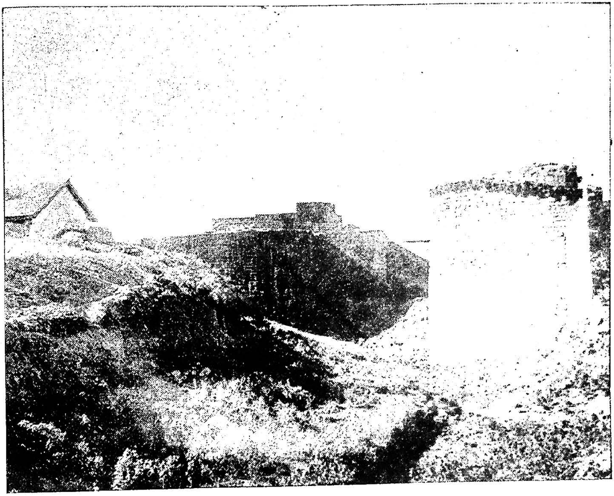
A general view of the Golconda fort, from the ruined Palace below. Clearly seen is the great labyrinth of formidable ramparts that protect the citadel on the hill. The staircases that lead from the Bara Dari to the palace is also seen in the centre of the picture.

GENERAL VIEW
FORT GOLCONDA

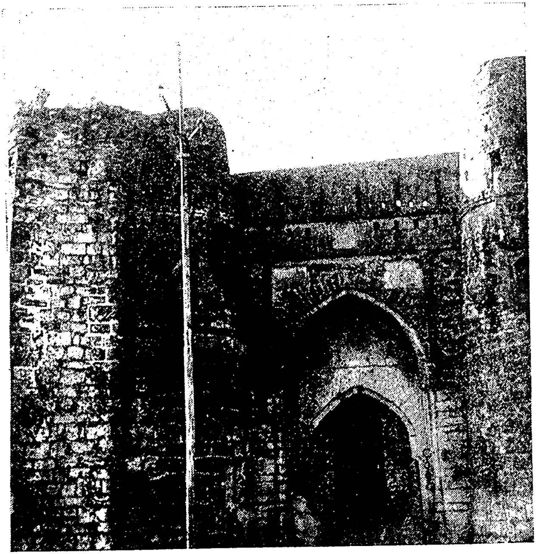




FORT BIJAPUR : The bastion on which the famous Mulki-i-Maidan stands.



A view of the same bastion as in XXXV from the ditch encircling it.



Gulburga Fort. Gate to the fort. The arched gate is flanked on either side by towering bastions and its piked timber doors are still in position. It is protected by a barbican.

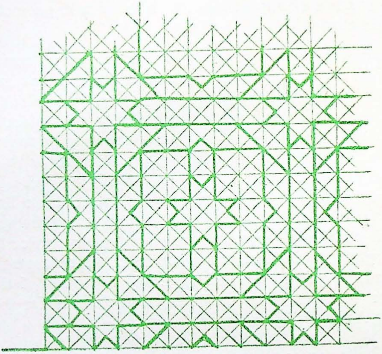
ENTRANCE GATE : FORT GULBURGA

tain types are of extremely common occurrence. None of the Deccan examples seems to be original. They are to be found on Islamic structures all over India. In this connection, the reluctance of the stone cutter to wield his chisel for creating floral patterns is most marked. The Gujarat and Delhi craftsmen had created masterpieces with the help of the tree and vine motifs and floral motifs. The lack of any such work points to the conclusion that the Deccani draftsmen were not well versed in this art and remained satisfied with copying older patterns of geometric designs. The absence of any original designs even in geometric patterns supports this conclusion.

A word about the use of these screens in some Deccani buildings is necessary. As stated above, the various houses etc. that have now disappeared would have contained good specimens of the jalis. The perforated screens used at Jalana are built in the wall that surrounds the mosque. In an arched opening several patterns are made to fit in. Hence the space each motif gets is absolutely limited. Similar is the case of the window openings that are seen at Bijapur or Hyderabad. Most of the openings are arched but their dimensions are too small to bring out the real beauty of the trellis designs used. It is only when the space covered by the screen is considerable, at least say ten feet by ten or twelve, that the repeating patterns in the screen work impress themselves on the onlooker. Thus not only in the technique and execution of the jalis, but also in the use of them were the Deccani architects far behind their counterparts at Agra, Delhi or Gujarat.

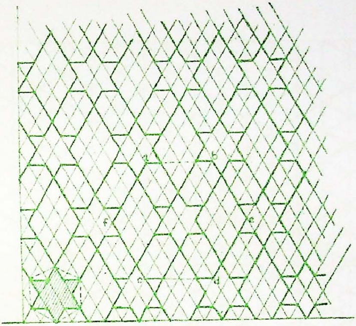
The construction of some of the patterns is explained in the following pages.

It is not necessary to explain the construction of the patterns shown in photographs numbers XXVIII and XXIX as they are very simple.



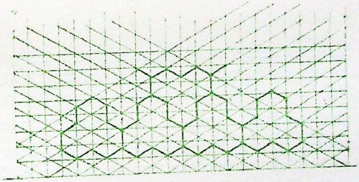
Number 1

The design illustrated on Plate XXIV and explained above is obtained by the following method. In addition to the vertical and horizontal lines from each point, lines are drawn at an angle of forty-five degrees from the base line. The removal of the unwanted lines would give the pattern. The chief motif is a square on the corners of which are eight pointed stars.



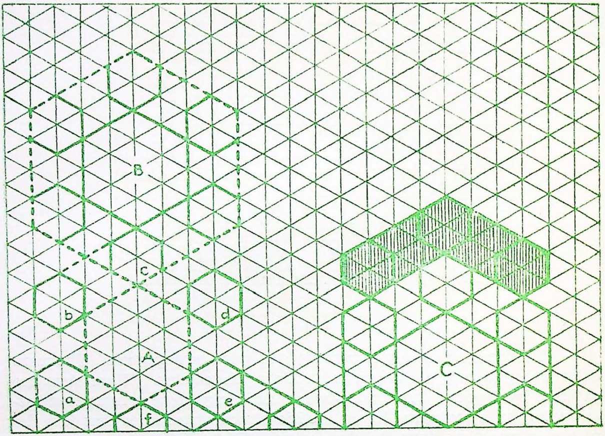
Number 2

This design is a very elementary one based on hexagons. The main determining feature, as is obvious is the six-pointed star. These stars are obtained by drawing lines at one-twenty and sixty degrees from equidistant points on a horizontal line. Additional horizontal lines that join the proper intersections form the star design. [Plate XXV].



Number 3

The pattern is formed thus : Points are marked on a line at fixed intervals. From every alternate point angles of one-fifty and thirty degrees are drawn. From every point perpendicular lines are drawn. The resulting network of lines forms the skeleton. Elimination of portions of lines that really form sides of a hexagon, results in this design. [Plate XXV].



Number 4

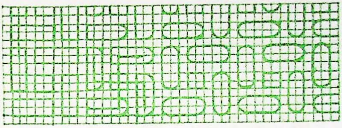
This is the most complicated pattern of the hexagon series. Its construction does not differ much from that of the previous one. The stages that lead to the ultimate or final design are as follows:

An hexagon, marked by dotted lines is made out first.

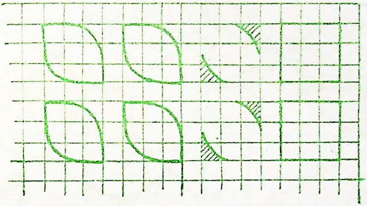
A — From each corner of this hexagon, smaller ones are projected, their width being half of the previous one (a, b, c, d, e, f). It may be noted that the outer lines of these six smaller hexagons form a bigger hexagon. This bigger one is shown in dotted lines . (B).

A repetition of this firm hexagon gives the pattern. In this case two smaller hexagons are common to bigger ones.

However, in the trellis work under discussion the repeat pattern is not used quite strictly. The portion shown in hatched lines, which itself results from the same basic framework, (C) is interposed between two bigger hexagons [Plate XXVI].

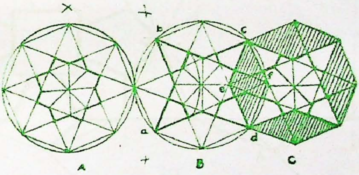


Number 5(a)



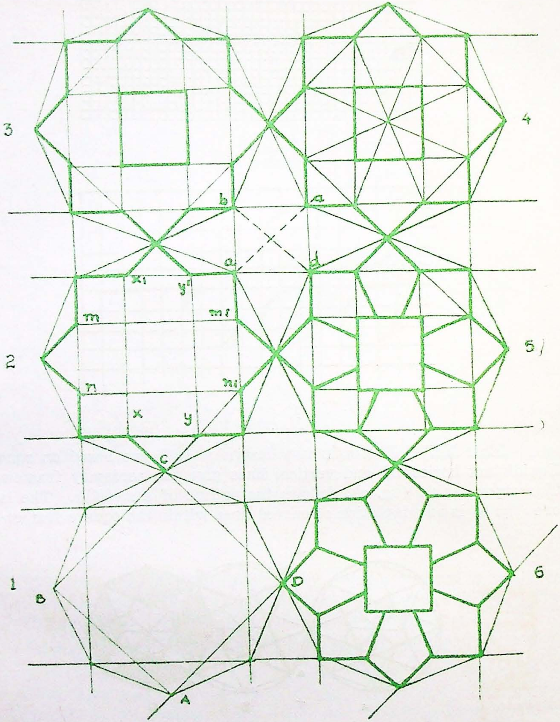
Number 5(b)

Plate XXVI illustrates two designs. Both are based on squares. Equidistant horizontal and vertical lines give the necessary framework. The upper design (fig. a), follows the outline of a swastik. The lower one (fig. b) is an adaptation of curved lines within the square framework.



Number 6

This pattern is based on octagons. Here the octagons overlap (shaded portion of the figure) instead of touching each other. 'A' shows how the eight pointed star in the centre and its spokes are arrived at. 'B' shows the prominence gained by the four pointed star, a, b, c, d. 'C' shows the overlapping portion c, e, d, f. A repeat of these overlaps gives the design [Plate XXVII a and b].



Number 7

Photograph number XXVII c shows and the above figure explains one of the common octagonal patterns used in Islamic art. A number of octagons are placed near each other so as to meet one another at alternate angles (AB CD). Placing the octagons on parallel vertical and horizontal diagnonals facilitates the construction. An eight pointed star is then made by joining the points of the octagon. Join points X-X1, Y-Y1,

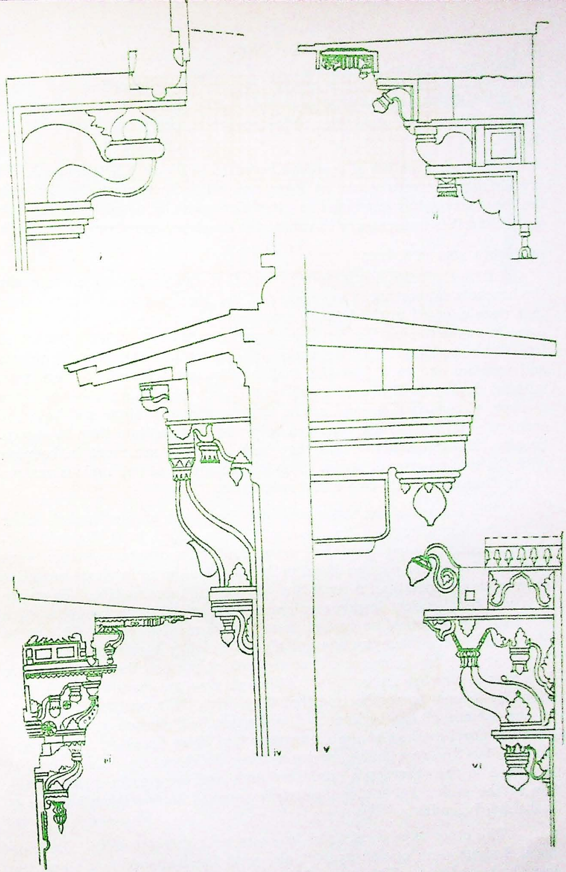


Fig. 21

Brackets and Cornices
(i) Ali Shahi Pir Mosque, Bijapur. (ii) Gol Ghumat, Bijapur. (iii) Malik Jehan Begam Mosque, Bijapur. (iv) Bahlol Khan's Mosque, Bijapur. (v) Tomb near the tomb of Sultan Quli Qutb, Golconda. (vi) Kumbhar Mosque, Bijapur.

M-M1 and N-N1 to get the central square. By connecting the obtuse angles of this star the spokes are ready. The points (a b c d) are then joined to their opposite angles of the bordering octagons to complete the design.

The construction of designs illustrated in Plates XXVIII and XXIX are similar to trellis works at Agra and other Mughul works and they are most adequately explained in a treatise specially devoted to this subject.[1] And it is unnecessary to repeat the constructions given in the book.

BRACKETS AND CORNICES

It has already been pointed out that the projecting cornice and the brackets supporting it were some of the few features of Hindu origin that were adopted in the Islamic architecture of this area. This feature came in vogue during the Adil Shahi period, although it first appears in late Bidar buildings. At Golconda and Hyderabad the heavy brackets and cornices are used; but the most artistic employment of these was, without doubt, at Bijapur. In all probability, this was so, because the medium of construction used at the latter centre was stone and both the cornices and brackets are rendered better in that medium than in stucco. So also the deep shadows that they help to create are more in keeping with the sombre grey of stone. The brackets used at the various centres in the Deccan fall into two broad categories.

The one most commonly used has the shape of the English letter S laid horizontally. ∾ To this motif were added lotus flowers, bud-shaped pendants, and 'kani'-like mouldings. On ornate varieties were carved in low relief various floral patterns. The more intricate varieties show nothing more than a repetition of most of these motifs. To create a larger bracket for deeper cornices a number of these brackets were put together, as would be evident from figures number 21 and 22. Some of the individual examples are quite good looking objects in themselves, but their real beauty comes out really well only when they are standing in a row to support the cornice. Although they are discussed here individually, it must be emphasised that they serve their purpose collectively in the scheme of the building. The Mushirabad mosque at Hyderabad shows a novel method of the arrangement of these brackets. The latter do not directly support the cornice as they do elsewhere. Each bracket is joined to the other by a miniature arch and the cornice rests on the top of the arch. From the edge of the cornice hang slightly elongated bud-shaped pendants.

The other type consists of brackets with straight sides. Delicate floral designs were carved upon it also with the S-shaped motif and the lotus-bud pendants. This type of bracket is more common, and is suited

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1 HANKIN, *The Drawing of the Geometric Patterns in Saracenic Art.*

Fig. 22

(i, iii, v) Mihatari Mahal, Bijapur. (ii) Gol Ghumat, Bijapur. (iv) ?

to woodwork. One such example from the period, in wood, comes from the Rangin Mahal at Bidar. Another example is from Bijapur. They are on the Mihtari Mahal. These brackets are in stone but are fashioned after wooden prototypes. The designs in this case are: floral patterns, pendants, S-shaped motifs and animal and bird representations that fit in this particular shape. All are cut in extremely low relief. The excess ornamentation, the motifs used, and the light appearance of the building all suggest that the Mihtari Mahal, at Bijapur, though built in stone was modelled after wooden originals, or conceived and executed by architects accustomed to timber construction.

The cornice itself generally remained quite plain, i.e. its section was always straight. It acquired the typical wavy section so common to Hindu temple cornices only very rarely.

NECKINGS AND DRUMS OF THE DOMES

The shapes of the dome and the height and ornamentation of their drums and neckings were closely related. In the Gulburga and early Bidar periods, the domes were hemispherical and there was no drum or necking distinct from the general structure of the dome. Of course, there existed that part of the dome known as its drum, but it was not visible as a separate feature in the outline of the dome. As the shape of the latter was becoming more and more bulbous this part gained in prominence. In the later period the fashion of setting battlement parapets in relief against the base of the dome had become current and several varieties of stucco designs had started making their appearance. The Bijapur structures which generally display exquisitely carved stone work have not lavished much attention upon the parapet shaped ornamentation of the dome. The only refinement over and above the battlement-parapets was the turning of these battlements into a petal-shape and the flaring section given to these long slim petals. It is the Golconda and Hyderabad buildings and also some Bidar works that have devoted great attention to the neckings. [Figure number 23].

a — The most primary design is the battlement parapet.

b — This was decorated in a number of ways. A thin band was incised upon them so as to run parallel to the outline of the parapet.

c — A miniature replica of itself was often introduced at the base.

(a) Jammi Mosque, Bijapur. (b) Mahmud Quli Qutb Shah tomb, Golconda (c) Hadrat Khalil Ullah Chaukhandi, Bidar. (d) Ali Shahid Pir's Mosque, Bijapur. (e) Afzal Khan's Mosque, Bijapur. (f) Abdul Qutb Shah, Golconda. (g) Mosque near tombs, Golconda. (h) Tomb near Golconda. (i) Quli Qutb Shah tomb, Golconda. (j) Jamshid Quli Qutb tomb, Golconda. (k) Tomb near Golconda. (l) Hadrat Banda Nawaz, Gulburga. (m) Sultan Ali Barid's tomb, Bidar. ⟶

Necks and drums of Domes.

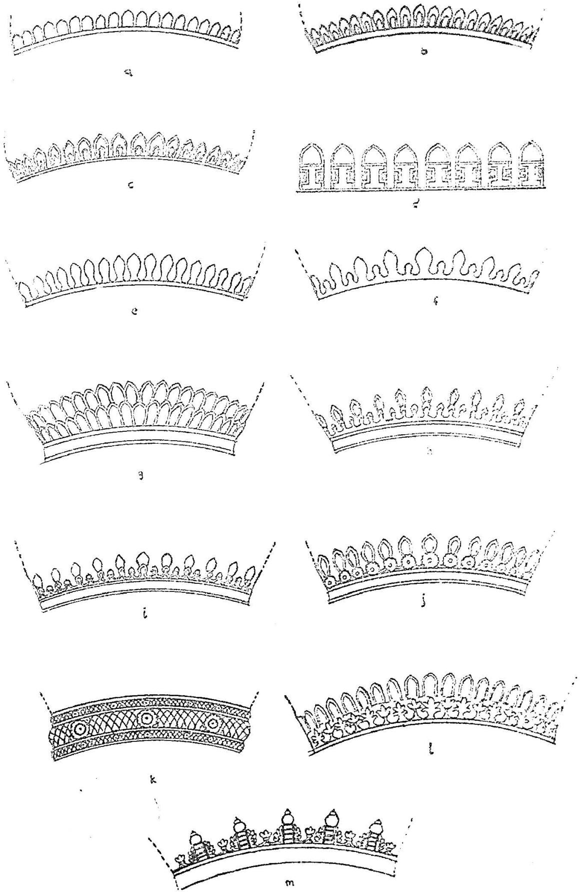
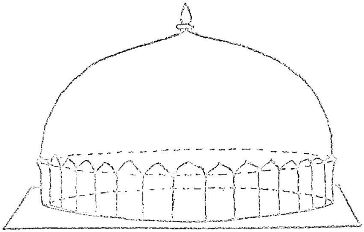
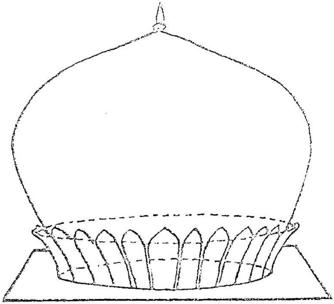


Fig. 23





d — A highly elaborate version is found on the Shahid Pir Mosque at Bijapur where on either side are cut in relief motifs like the 'kalash' in Hindu sculpture.

e — This motif was later turned into a petal-like shape by constricting the base of each member. This was the result both of the artists' imagination as well as the fact that the petal is occupying a position where it would tilt along the wall as the outline of the dome takes a sharp inswing. In other words, the diameter of the dome where it touches the shoulder of the parapet would be larger than at the place where it touches its base, making the circumference at the former point larger than the one at the latter. And in this situation, the most artistic and logical solution would be the increase in the breadth of the parapet at its shoulders so as to suit the increased circumference at that spot. The figure in the inset would explain the change. The petal design is now onwards used to evolve various

designs in stucco. These designs generally take the course described in the following examples.

f — Petals are placed in a row, a smaller one alternating with a bigger one.

g — Two rows are placed one upon the other so as to create the impression of a blooming flower.

h — The same motif is employed in three rows, the lower-most being the smallest.

i — The design shown in 'i' in figure 23 is also utilized for this purpose.

j — At Golconda is seen the next step. All the independent members come to be linked together with the vine and bud band.

k — The most popular feature at Golconda undoubtedly is a band of thick wreath interspersed with rosette medallions. The band girdles the necking immediately below the petal lines.

l — Floral designs of great beauty such as shown in 'l' are employed at some places in combination with petals.

m — The design on the dome of the tomb of Sultan Barid Ali has utilized the minarets and vine motifs to great effect.

WOODWORK

For the decoration of domestic architecture woodwork was largely utilised. Although the construction of the mansions largely adhered to the arcuated form, wooden structures on trabeated style were quite popular as seen by the remains of various palaces from Bidar and Bijapur. Very few remains of the woodwork of these structures are extant today. However, those that are in existence or have been recorded by previous observers are enough to give us some idea of the type of work executed in this area. The parts of timber in these structures that were highly decorated were the pillars, brackets, beams and ceilings. The pillars were mostly square or octagonal columns. Many times they were of great dimensions as at the Asar Mahal at Bijapur where each of the four central columns was thirty-five feet in height and had a circumference of four feet. The pillar shapes do not seem to have undergone any change, new shapes like the cypress pillars at Delhi are not to be seen. The shafts were plain, but a great deal of carving was introduced on their capitals in many cases. This consisted of a stepped arrangement of several mouldings where the upper one projected somewhat from the lower. Bead and flower motifs were carved on these. Here the brackets were enlarged to form the two parts of an arch. The lower edge of the brackets was cusped and lotus pendants hung from each stage. On the body of the brackets were carved vines and flowers as delicate as those in painting. Their execution is generally very good.

The beams were strictly utilitarian, no special attention being lavished on them. The brackets and ceilings claimed all the attention. They were treated with the most intricate and exquisite carving. The type of bracket most in use, other than the ones described above, was the slanting support to the beam quite like the hypotenuse of a triangle. This was carved with vines and flowers woven around various birds. Often the typical 'S' shaped pattern makes its appearance on them. The ceiling designs follow the traditional geometrical patterns and repeat motifs.

It is to be confessed that lack of evidence does not allow a fuller appreciation of Deccani woodwork. However, if later Maratha works, which were more or less a continuation of the Deccani art, are any guide, there should be little hesitation in saying that the wood carving of this region was a highly developed craft.

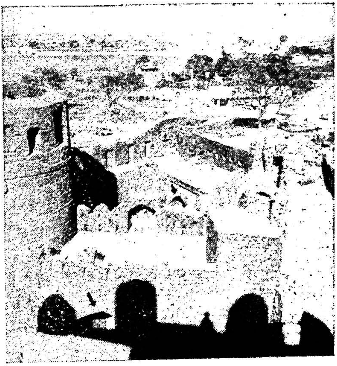
V. FORTS

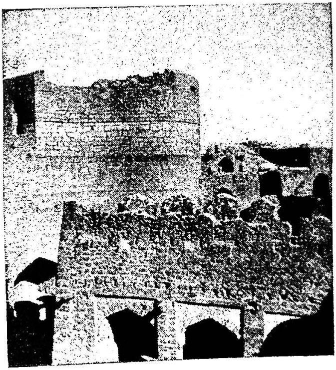
In keeping with the general aim of the work, Islamic forts in this area are discussed here as a class or a type. As such, descriptions of individual fortresses do not find any place here. Most of the forts have been described in great detail elsewhere and it would serve no useful purpose to repeat those details. Moreover, such a discussion does not suit the aim of this study, which is to analyse and to study various types of buildings. From this point of view, military architecture is a larger group and townwalls and fortresses are the sub-groups. Both these sub-groups have various things in common. Various features of both that can be called characteristic are dealt with below. Many of these contingent parts of Deccani forts are such that their real significance cannot be brought home through words alone. Hence a number of illustrations are specially prepared for the work. Especially the general plan or layout of a military stronghold, the disposition of gates, etc. can be explained with the help of illustrations only. They are prepared from existing Islamic fortifications.

The art of fortification was practised in India from very early times. Towns belonging to the Indus Valley Culture had strong protective ramparts round them. Vedic literature abounds in references to '*durgas*'. Sculptures and literature from around the beginning of the Christian era show and describe fortifications. The art and science of erecting formidable masonry barriers were highly developed. The ancients had given careful thought to all the aspects of military architecture. Treatises like *Arthashastra* or the *Niti* works explain all factors, starting with the strategic location of strongholds to the minutest detail regarding provisions and payments etc. Early medieval India could boast of several redoubtable fortresses, Deogiri being one of these. In the Deccan the Yadavas and the Kakatiyas were great builders of forts and many of the more well-known Deccani forts are situated on the spots where once their forts stood [Plate XXX]. Certain elements were considered essential to Indian forts. Among them count strong battlemented ramparts and gates strengthened by towers; broad and deep moats with the proper arrangements to flood and drain them; the creation of traps, pitfalls, underground approaches, etc. and the necessary measures to provide the fort with water and food supply. The ramparts were constructed of large stone blocks set in dry masonry and the towers were angular or square but not round. The gates had large trabeate door-frames. So long as the mainstay of assault was weapons like bows and arrows, javelins and swords, these forts served their purpose well. With the introduction of

gunpowder these fortifications became completely out of date. It was the Islamic armies who first used guns on a large scale in Indian wars. By the end of the fourteenth century use of gunpowder became widespread. The new fire-spitting machines made imperative revolutionary changes in the hitherto common modes of warfare and defensive architecture. Some aspects already existing achieved a greater significance and vitality while some new ones were added. The changes concerned two chief factors of gun-warfare. In the first place, the great destructive power of the shells and other forms of gun-fire had to be taken into account. Similarly the range of the guns was a vital factor. The former called for an immense increase in the strength of military structures and the latter increased greatly the diameter of the outer perimeter of the fortifications. In other words, the fortifications became both in mass and the area covered vastly greater than earlier ones. Both these problems and sundry others dealing with gun-warfare had arisen sometime back in Europe and the solutions for them were also evolved there. The Crusaders brought these to Western Asia and from there came very slowly into India. The soldiers and architects of the Khalji and Tughluq Sultans who came to the Deccan were acquainted with this art. But the Deccani Sultans also brought it directly from Western Asia through officers and soldiers imported from that quarter. This is the origin generally traced.

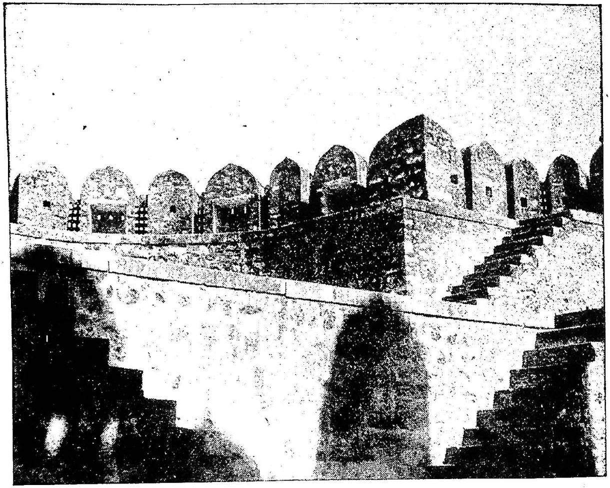
The Bahmani kingdom was protected on the north by the very good natural barriers provided by the Vindhya and Satpuda mountain ranges. Immediately to the north of the actual boundaries of their territory were the rivers Tapi and Narmada. To the west the Sahyadris and to the east the 'Ghats' stood sentinel over Bahmani interests. The Krishna and the Tungabhadra marked the ever fluctuating southern frontier. These features gave the Bahmani kingdom very good natural definition, but were not in themselves capable of providing adequate protection. Human agency had to complement them, which meant the erection of a string of forts girdling the territories under Bahmani domination. Places fortified by earlier rulers with reference to the then existing boundaries could not be neglected. Towns serving as seats either of the central Government or of provincial administrations had to be taken care of. Several highways were important commercially and militarily. A particularly troublesome area had to be kept in check. The best remedy for all these was construction of forts. The Bahmanis and the succeeding Shahis undertook the task most zealously. And thus came into existence in this region numerous fortresses, large and small. The great complications in the political situation at the beginning of the sixteenth century, when the Bahmani Sultanate disintegrated giving rise to a number of successor states resulted in an increase in the number of forts. Each new state strove to strengthen its ever-changing boundaries with the help of fortresses. A chain of strongholds hinging on those at Gawilgarh,





Inside view of the gate, Gulburga Fort. The arched cells seen in the foreground of the picture on the left hand housed guards. In the picture on the right the arrows mark the outer and inner gates.

ENTRANCES : FORT GULBURGA



A view of the barbican standing in front of the Bala Hisar Gate of Golconda Fort. The details of parapets and embrasures are clearly seen. The picture is taken from the gate.

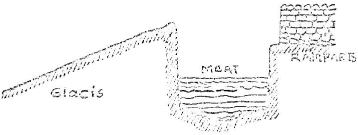
Narnala, Ellichpur and Mahur stood on the north and north-east. To the west Daulatabad, Purandhar, Panhala, Parenda, Naldurg and finally Gulburga constituted the nucleus of the defence. Mudgal and Raichur faced the enemy on the south and south-west. To the east, Warangal and Golconda supported by numerous smaller forts like Bhongir, Elagandol, Jagtil, Balaconda etc. guarded the frontier. In later years Bidar, Bijapur, Ahmednagar, Aurangabad, Sholapur and a number of other places were fortified and several strong fortresses were constructed in the hilly ranges on the west. The effectiveness of this system of fortifications is illustrated by an incident in the life of Mujahid Shah Bahmani. The Sultan beseiged the fort of Oodnee. "The seize continued for nine months but to no avail. Mallek Syef und Dien Ghoree, hearing at Gulburga of the unpromising state of affairs, petitioned the Sultan for leave to join him with his troops, as he had a great desire to see the fort of Oodnee, of which he had heard so many wonderful accounts. The Sultan having consented to his request, he marched with great expedition and soon had the honour of kissing the border of the royal Musnud. After reconnoitring the fortress, he observed to the Sultan in private that the conquest of such a place which had fifteen forts communicating with each other, was not to be hoped for in such a short time; that preparatory to it, the forts between the rivers from Goa to Malgaon and Bijapur should first be taken."[1] The Sultan accordingly raised the siege and returned to his capital."

The period over which all these forts were built is a span of three centuries and as such it is only natural that they differ from each other. This difference, this distinctness, is however, very slight and all of them follow the same principles of military engineering. The strength of each fortification is bound to vary according to the natural situation and according to the skill of the engineer concerned. But the essentials do not. They are : going from the outer perimeter towards the centre, glacis and counterscarp, moats, scarp, walls, towers and gun-turrets, gateways, storehouses, residential quarters and water-supply [Plate XXXII].

Glacis : The glacis is a sloping earthen mound encircling the entire outer perimeter. This serves a number of purposes, the most important of which is to provide an effective cover against gun-fire. The accuracy of the gun-fire was not pinpoint and a huge earthen mound of the same or even more height as the ramparts was likely to carry a great number of shells on itself, leaving the walls unharmed. Secondly, it prevented any stealthy approach towards the foot of the walls, as one had to climb the mound to go near the walls, thereby exposing himself. A very good example of a land fort provided with the protective glacis is the Warangal fort. From a distance one feels as if one is looking upon a huge earthen hillock, as nothing of the formidable ramparts or towers is visible. The outer ram-

1 SCOTT. *Ferishta's History of the Dekkan*, Vol. 1, 47.

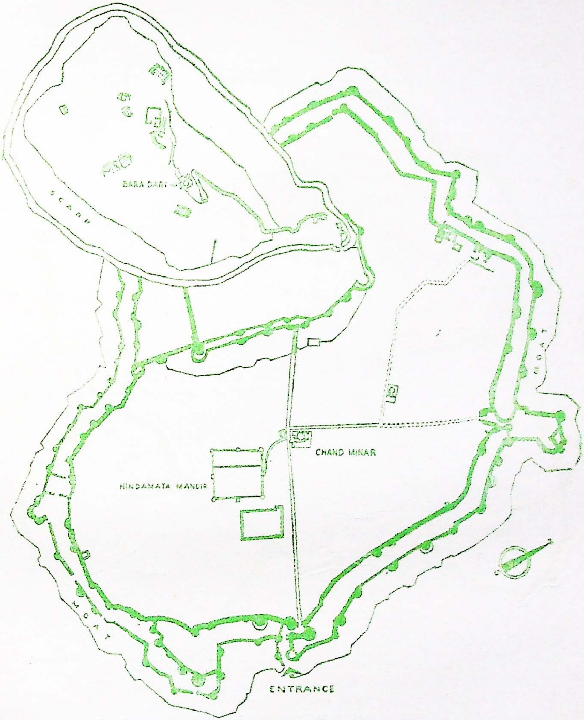
parts of the Golconda fort also have very good glacis before them. This feature is not mentioned in the literature about pre-Islamic fortifications. The section of the mound is triangular, one of the sides sloping towards the open ground, away from the fort. Immediately next to the glacis is dug the moat. The line of the glacis falls perpendicular to the base of the moat, making any attempt to get in the ditch difficult, though not impossible.



Sketch of section showing Glacis Moat and ramparts.

Moats : Immediately next to the glacis comes the moat, either a single ditch encircling the fortified area or a number of them. As at Bidar there were two or three lines of ditches and walls. Most of the Deccani forts like Bidar, Daulatabad, Golconda and Parenda, and almost all fortified towns like Ahmednagar, Bijapur, Gulburga, Sholapur have broad and deep moats included in their system of defences. They were always kept full of water and the only contact between the fort and the outer area was by means of a drawbridge. This could be easily removed and moreover was very well covered by fire from the ramparts and bastions. Both the sides of the ditches were kept steep and perpendicular.
[Plates XXXII and XXXIV]

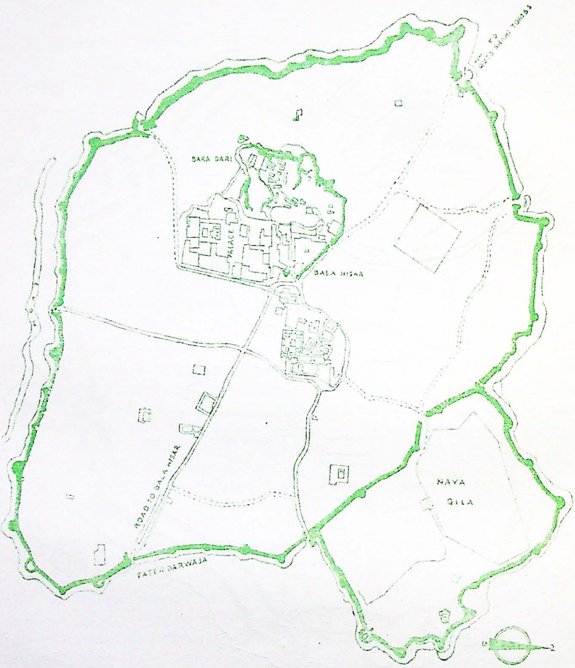
Ramparts : Strong stone masonry walls, more than seven to ten feet in thickness and twenty to thirty feet in height on the average constitute the real backbone of the defences. The indigenous method of dry masonry was dropped and lime mortar masonry became the rule. Above this wall were the battlements or parapet walls often as much as five feet in height. There were embrasures both in the parapets and the walls themselves. Ordinary gun-fire could be directed at the enemy through these holes. They were so arranged and their angles so adjusted that very large areas adjoining the fort came within the range of the defendant fire, while the defenders were well protected. In addition, balconies projected from the walls and bastions that served as excellent observation posts and also as pillboxes. Numerous staircases provided the approach to the parapets. In other examples like the Warangal fort, the inside of the walls was a large flight of steps resembling a ghat, or like the seats of a modern stadium. This was obviously not an Islamic feature as it is not repeated elsewhere. Access through the ramparts was to be gained only by means of the gates provided for. Or else the ram-



SITE PLAN OF THE DAULATABAD FORT

Scale 1″ = 150″

By permission of the Archaeological Survey of India



SITE PLAN OF THE GOLCONDA FORT
Scale 1′ = 200′
By permission of the Archaeological Survey of India.

parts had to be scaled with ropes and ladders or had to be blown up with dynamite. Both these pre-supposed either the overcoming of the defensive fire from the walls as also the crossing of the moats in the face of constant watch and prompt action of the defenders. Or else a spot had to be selected, with great patience or cunning diversionary raids, where dynamite or ladders could be used. In the case of well maintained forts both these alternatives were less than practical and hence impossible. Sultan Firuz Shah besieged the fort of Bilconda (Balaconda). The siege extended to two whole years; "at the end of which its reduction not being the will of heaven, a pestilence broke out into the royal army and fear filled the survivors."[2] Other forts tell the same tale. To capture the for of Bidar Yusuf Adil Shah had to use all sorts of stratagems including the holding Amir Barid to ransom against the keys of the fort. These incidents go to show how well the Deccani forts served their purpose.

At regular intervals and at strategic points along the line of the fortifications were projecting towers. They were similarly embattled. Generally they were semi-circular in plan but if need be square ones were also erected. Octagonal or hexagonal plans were common for bastions flanking the important gates. Very often small domed cells were built in the body of the towers. The most important purpose of these towers was as observation posts. However, guns could be easily mounted on them. In addition to these towers, very strong bastions were erected at certain points along the line of fortifications as well as outside it, to act as gun-turrets. These bastions stood on an eminence that could command a wide area surrounding them and were to a certain extent, what might be called an assertive part in an otherwise negative defensive complex. Heavy guns like the Mulk-i-maidan were fastened on them and arrangements for storing ammunition etc. were made in its construction. [Plate XXXV and XXXVI]. The citation of these bulwarks required considerable military skill and experience. They were generally situated outside the citadel, but inside the outer walls.

The picture upto now painted would lead one to think that the fortresses were a simple affair. Let it be made clear that this is not the case. The means used to defend a place were the same everywhere as described in the above lines. However, their application to a particular spot was far from easy. A number of important considerations had to be attended to, the first and most important of which was terrain. Just as a rough and hilly terrain afforded more protection or cover to a place, it also created difficulties for the architect. Ravines or low areas called for additional rows of walls. Various looplines and bastions had to be constructed. Jutting prominences of land had to be secured with towers. Approach

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[2] *Ibid.* 90.

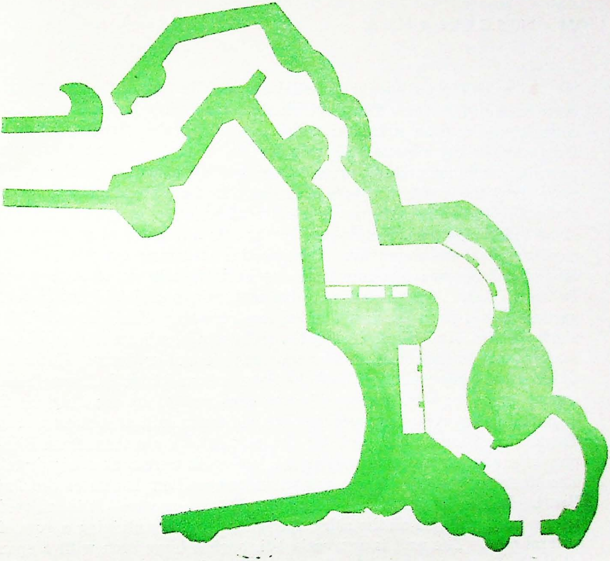
routes had to be covered. All this varied from place to place and hence the greatly complicated and varied aspects of the Deccani forts. The plans produced in Figures 24-25 would make this point clearer.

Gates : The ingenuity and knowledge of the architect were nowhere so extended as in the case of the arrangements of gates. The gate was the only inlet into the fortified area and as such the weakest part in the defensive scheme. By its very nature the gate could not be as strong as the solidly built stone walls. Even the very thick wooden doors fitted with long iron-pikes could not compare with the walls. This deficiency had to be made good by the introduction of human agency, mainly as made manifest by gun-fire. The safest way to protect the gate being to prevent all approach near it. This was achieved by the erection of barbicans and flanking towers, fire from which would make it impossible to come near a gate. Long pikes were fixed in the door to deter thrusts by elephants. Looplines were introduced immediately behind the gate. These lines also had a gate and towers, all battlemented. Thus if an enemy succeeded in forcing the outermost gate, he landed himself into a situation not quite dissimilar to the one before the opening of the first door. Here, however, he was at a disadvantage as fire could be directed at him even from behind. The ground between the first gate and the next one might be a small quadrilateral space as at Bijapur or might be a zig-zag labyrinth as in the case of the Gulburga gates. Over these spaces loom large a number of bastions of inner ramparts and gates. The illustration in Figure 26 would explain the arrangements of gates. [Plates XXXVII XXXVIII XXXIX]

Scarp : This is a feature common to hill forts and the Daulatabad fort displays a classic example of a scarp. Here the rock is cut absolutely perpendicular to a height of three hundred feet. This device makes the upper tableland literally inaccessible. The only approach was by a steep narrow path winding deviously through the ribs of the hill and through underground tunnels.

Citadel : The forts and fortified towns were divided into two distinct entities. The first was a larger one and encompassed within itself the second and smaller one. The former was the fort proper and skirted along the smaller, but similarly fortified area known as the citadel or arkillah. The latter, a fort within a fort, repeated all the important features of the former. It conained the royal palaces and government houses. The arkillahs at Bijapur, Daulatabad, Golconda todate preserve their general appearance and indicate the relation between the inner and outer works. Plans produced on Figures 24-25 show the two entities distinctly. [Plate XXXIV]

Well stocked stores of grain and ammunition, stables for cavalry, government houses and unfailing sources of drinking water completed the material and structural equipment of a fort.



Sketch plan of the entrance to Gulburga Fort.

The Deccani forts were by and large excellent specimens of the art and science of military architecture. Most of them were impregnable. Only stratagem depending on treachery or else starvation through long drawn sieges could reduce them. This did not happen very often, as has been indicated by episodes in the Bahmani history quoted earlier. Forts being parts of a much larger defence net-work, arrangements existed for weeding out any treacherous elements and sieges could be raised in time with the help of diversionary raids and alliances. The Deccani forts are the most vigorous expression of the war-like tendencies and politics of the rulers. Even the gloomy shells remaining today do not fail to impress the onlooker with their sturdy strength.

VI. MISCELLANEA

The chief constituents of the Islamic architecture of the region have been examined so far. The discussion relates mainly to what might be called the artistic as apart from the scientific, architectural as distinct from engineering aspects. Now under the head 'miscellanea' are discussed some minor architectural features and some features which speak more about the engineering side of things. In the first category the most obvious topic is the gardens. The ruins of buildings and towns as they stand today afford no glimpse into the layouts and plans of gardens and pavilions if there were any. The practice of laying out big gardens around palaces was certainly there, as Ferishta tells us of Alla-ud-din Bahmani II, '. . . he erected a magnificent palace, and laid out elegant gardens round it on the banks of a piece of water. This he called the abode of bliss. . .'.[1] Traditionally the architectural scheme of a palace or mansion usually did consist of a surrounding piece of greenery. However, whether the congested citadels of the Bahmanis and later Sultans offered enough scope for vast gardens like the ones created by the Mughuls is doubtful. Then come the various ponds and tanks built at various places. The most well-known and probably the most artistic are those from Bijapur. Here, water was near the surface, 'and wells were sunk everywhere'. The largest of these wells was a spacious composition, known as the Taj Bauri. It is a sheet of deep green water 223 feet square. It is enclosed within high walls on all the sides, the northern one containing a row of several cells. The well is approached through a large arch with a span of thirty-five feet, erected in the central portion of the northern side. This opening is flanked by small octagonal structures rising to two storeys and surmounted by bulbous domes. A running balcony projects on the water from all the four walls, giving an excellent view of the entrance arch. Various stairs lead down to the water. Provision has been made for drawing water by water-lifts. The large pool in front of the Ashar Mahal that has recently collapsed was a delightful spectacle. A very small tank held in its centre the small water pavilion opposite the Sat Manzil at Bijapur while larger pavilions were located at Kumtagi, a suburb of that place. If necessary water was led to these large ponds from distant reservoirs, located on higher ground. These arrangements are described below under 'water-supply'.

Any achitect, more especially some one who would be in charge of laying out a new town would certainly have some ideas and concepts of

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[1] SCOTT. *Ferishta's History of the Dakkan,* Vol. 1. 74.

town-planning before him. As far as the Deccan goes, the royal capitals were located on spots that were already inhabited and as such Islamic architects had their hands tied down. Only in the case of a few spots like the pleasure resort, Firuzabad on the Bhima, was it possible for them to have a free play of their imagination. But this was by its nature a very limited enterprise and town-planning in its real sense was not needed. We are assured by Ferishta that in Firuzabad, built by Firuz Shah Bahmani on the banks of the river Bhima, 'the streets were laid out with regularity and were very broad'.[2] Bidar itself has its main streets running parallel to and at right angles to each other. The Madrasa road, running north-south and the Shahganj road running east-west are quite straight and broad. The roads at Hyderabad, delving on the Char-Minar are similarly in a straight line and at least the one running east-west is spacious. This arrangement of streets, certainly facilitated military transport and this might have been a consideration, apart from their aesthetic appeal, weighing in the minds of the planners. Apart from the roads, the most important feature of Deccani town-planning is undoubtedly defence requirements. This was a cardinal necessity and all other considerations are subordinated to this one. This would lead to the selection of the proper spot, strategically defence-worthy, where water is available and which is not far from the chief routes of the kingdom.

Great water-supply networks are a notable feature of Deccani capitals. Water thus brought was utilised for two purposes. First to supply water for the daily life of the monarch and other people. Secondly, water channels, small ponds and fountains played an important role in the architectural scheme of the palaces. Bidar, Bijapur, Firuzabad, all had water channels and fountains around their mansions.

Water was brought by open canals as at Firuzabad, but more often through underground conduits. These conduits were either brick-built or were made of tight-fitting terra-cotta pipes. The descriptions of the channels at Ahmednagar and Bijapur, recorded at a time when they were in good order, make the following important points :

1. Water was supplied to the cities from sources some miles distant and on a higher plain. The difference of levels was carefully ascertained and this enabled the engineers to take water upto heights of forty or more feet in the city palaces.

2. The sources tapped were usually wells with an unfailing supply of water. In addition, other possibilities were also taken into consideration. For example, the channels of brick masonry that conducted water from the Surang Bauri to Bijapur proper is lined by concrete only on one side. 'The reason for this is that the strata of rock and murum

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[2] *Ibid.*

through which it passes dip from south to north, so that water percolating down through the strata is intercepted and falls into the tunnel where it is diverted towards the city, the opposite side of the tunnel being concreted to prevent its escape'. This clearly shows that the builders were experts in water-supply engineering.

3. The conduits, whether in brick or of terra-cotta pipes, were provided with air-shafts. A hollow tower was built. It acted as a trap to intercept silt, and also helped to break the force of water to lessen the strain it would otherwise exercise on the channel. The inlet pipe entered the shaft at a level lower than that of the take-off pipe. Thus the latter carried off only the clear water, the silt being deposited beneath. These towers were erected at regular intervals and were periodically cleaned. Similar arrangements exist at Ahmednagar, where water was brought from some fifteen suburban villages.

4. The water brought through these pipes was then led to private houses or wells and reservoirs meant for public use.

5. The distribution of water in a particular house or palace was done with terra-cotta pipes of various diameters. One end of each pipe was smaller than the other and fitted perfectly in the next one. The joint was then covered with lime and mortar. Such lines are seen all over the palaces at the Golconda fort. Water usually came from higher levels and thus could be raised to great heights. In case this was not possible, it was raised by Persian wheels to tanks on water towers and from there distributed.

These features are common to all the places where water-works were constructed during Moslem times. Dams were widely used. One exists today in the Naldurg fort. But only the typical Islamic features are discussed above in detail.

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ON THE ACCENTUATION OF THE VOCATIVE ṚTĀVṚDHAU IN RV. I.2.8.*

by

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This paper attempts (1) to examine HASKELL's remark that the only exception in the Ṛg Veda to the general rule for the accent of initial vocatives, is in RV. I.2.8., where such a vocative, standing between two unaccented vocatives, is itself unaccented; (2) to summarise the arguments of SĀYAṆĀCĀRYA and ŚRINIVĀSAYAJVAN for justifying the unaccentedness of *ṛtāvṛdhau,* in the light of the traditional *Munitraya* grammatical procedures; (3) to point out the metrical evidence in favour of the unaccentedness of *ṛtāvṛdhau;* (4) to study the occurrence of the vocative *ṛtāvṛdhau* in corresponding passages of RV. and (5) to draw probable conclusions on the foregoing analysis of the vocative accentuation.

In the eighth *ṛk* of Ṛg Veda I.2., MADHUCCHANDAS pays a tribute to the truthful character of *Mitrā-varuṇau,* who, in the language of OLDENBERG, "belong to the silently shining exaltedness of a holy kingdom which safeguards the order of the cosmos and punishes the sins of mankind."[1]

The *Saṁhitā* text reads as under :

> *Ṛténa mitrāvaruṇāvṛtāvṛdhāvṛtaspṛśā*
> *Krátum bṛhántamāśāthe.*

The *Pada-pāṭha*[2] renders it as under:

> *ṛténa / mitrā-varuṇau / ṛta-vṛdhau / ṛta-spṛśā /*
> *Krátuṁ / bṛhántam / āśāthe iti* ||

GELDNER translates : *"Durch die Wahrheit habt ihr, Mitra und Varuṇa, ihr Wahrheitsmehrer* (*ṛtāvṛdhau*), *Wahrheitspfleger* (*ṛtaspṛśā*),

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[1] *Die Religion des Weda,* p. 181.

[2] Vaidic Samshodan Maṇḍal Edn. Poona; vol. I, p. 46.

hohe Enisicht erlangt".[3] (By truth, O *Mitra* and *Varuṇa*, you augmenters of truth, fosterers of truth, you have attained the high insight (judgement). The term *ṛta* in the compound *ṛtā-vṛdhau* is interpreted by GRASSMANN as *"an Recht* (Right), *Gerechtigkeit* (Justice or Righteousness), *Frömmigkeit* (Piety) *sich freuend".*[4] *Sāyaṇa* renders it as — "O *Mitrā-varuṇau*, augmenters of water (truth or sacrifice) and dispensers of water, you encompass this magnificent *Soma* sacrifice, by virtue of the fruit, *i.e.* truth"[5]. Following the above translation, LANGLOIS writes the meaning thus: *"O Mitra et Varuṇa, vous qui (d'une main favorable) touchez notre sacrifice, vous dont ce sacrifice augmente la force, (Voyez comme) par lui vous obtenez d'abondantes offrandes".*[6] (O *Mitra* and *Varuṇa*, you who (with a favourable hand) touch our sacrifice, you whose vigour (strength) is augmented by this sacrifice, (see how) through it, you obtain abundant offerings).

A compound word has the acute accent on the last syllable. In *ṛtāvṛdhau*, a dependent determinative (*Tatpuruṣa*), the original compound accent is retained as *per Pāṇini* VI.1.223 and VI.2.139.[7] But as *ṛtāvṛdhau* is treated as a vocative dual form in RV. I.2.8 ab., the vocative accent will debar the compound accent.

According to the Pāṇinian system of vocative accentuation, the two well-known and general rules are that (a) the vocative, when accented has the tone on the first syllable (VI.1.198) and (b) all the syllables of a vocative are unaccented when a word precedes it (the vocative), and when it (the vocative) does not stand at the beginning of a hemistich (*pāda*) (VIII.1.19).[8] *HASKELL* has pointed out that "of vocatives standing at the head of a sentence or *pāda*, and therefore, accented, the Ṛg Veda appears to have 1113 cases, and the Atharvan 273, making 1386 in all". He has also pointed out that "of single vocatives not standing at the beginning of the sentence or *pāda*, and therefore, unaccented, the Ṛg Veda has 4960 examples, and the Atharvan 1042, making a total

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3 *Der Rig-Veda*, HOS. vol. 33. (1951), p. 3.

4 *Wörterbuch zum Rig-Veda;* (1955). p. 287.

5 *"He Mitrā-varuṇau....ṛtāvṛdhau- ṛtamityudakanāma* (*Nirukta* 2.25), *'satyaṁ vā yajñaṁ vā' iti Yāskaḥ (Nirukta 4.12)- udakādīnām anyatamasya vardhayitārau....ṛtaspṛśā- udakādīn spṛśantau .... bṛhantam- ati prauḍham.....kratum-pravartamānam imam soma-yāgam ṛtena- avaśyaṁ-bhāvitayā satyena phalena āśāthe- anāśāthe vyāptavantau".* SĀYAṆA's Commentary on RV. 1.2.8.

6 *Monde Ancien* I; *Poesie Lyrique; Inde Rig-Veda traduction de* A. LANGLOIS. see p. 42.

7 *Samāsasya* (VI.1.223); *Gati-kāraka-upapadāt Kṛt* (VI.2.139): "In a *Tatpuruṣa*, a word ending in a *kṛt*-affix preserves its original accent, when preceded by a *gati*, or a *kāraka* or a word which gives occasion for compounding (*upapada*)".

8 *Āmantritasya ca* (VI.1.198) and *Āmantritasya ca* (VIII.1.19) Cf. WHITNEY's *Sanskrit Grammar*, (1889), p. 108.

of 6002".[9]

The vocative *ṛtāvṛdhau* in RV. 1.2.8. occurs at the beginning of the second hemistich and it should have the initial vowel accented. As a matter of fact, the three vocatives, *mitrāvaruṇau*, *ṛtāvṛdhau* and *ṛtaspṛśā* are unaccented and in the *Saṁhitā* text they acquire the monotone (*ekaśruti*) in the traditional Ṛg Vedic recitation. Hence comments HASKELL: "The only exception in the Rig-Veda to the general rule for the accent of initial vocatives is the following passage, where such a vocative, standing between two unaccented vocatives, is itself unaccented; (*ṛténa mitrāvaruṇāv*) *ṛtāvṛdhāv* **ṛtaspṛśā**, I.2.8.b. It must unquestionably be regarded as an error of the tradition".[10]

SĀYAṆACĀRAY'S *arguments* :

In his scholarly commentary to the *ṛk* noted above SĀYAṆA demonstrates that the unaccentendness of *ṛtāvṛdhau* is justifiable, in the light of the grammatical procedures set up by PĀṆINI and KĀTYĀYANA.[11] The arguments of the learned commentator are indicated as follows :—

The rule *"Subāmantrite parāṅgavat svare"* (Pāṇ. II.1.2.) enjoins that a word ending in a *sup*, when followed by a word in the vocative case, forms part and parcel of the vocative for purposes of accent. The basic condition for the operation of this rule (II.1.2.) is the interrelation between the preceding noun-form and the succeeding vocative. This *sūtra* will then, inevitably allow the operation of Pāṇ. VI.1.198 according to which the acute accent falls on the first syllable of a word ending in a vocative case-suffix. To illustrate this, SĀYAṆA cites the vedic tag, *"Márutāṁ pitas-tádahaṁ gṛṇāmi"*.[12] Generally the acute falls on the final syllable (*antodātta*) in the morpheme *marút*; but the *udātta* rests with the initial vowel in the morphemic sequence, '*márutām*, as *per* the rule VI.1.198. The mutual expectancy (*paraspara-sāmarthya*) exists between *márutām* and *pitaḥ*, or in other words, the *parāṅgavad-bhāva* (entering into the body of the latter or literally forming the component part of the subsequent vocative expression) which is demanded by the rule II.1.2., is invariably present in this instance, and thus, the initial syllable in *márutām* is accented.

In RV. I.2.8. ab., the acute lies on the penultimate syllable of the phonemic sequence *ṛténa*. The original accent is retained according to

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[9] *On the Accentuation of the Vocative Case in the Rig and Atharva Vedas.* JAOS. vol. XI. Article II. p. 58; October 25th, 1877.
Cf. MACDONELL's *A Vedic Grammar for students.* p. 466. (Appendix III). "When it does not begin the sentence, or *pāda*, the vocative being unemphatic, loses its accent. *e.g.*, *ṛtena mitrāvaruṇā*.... *ṛtaspṛśā* (Through law, O law-loving, law-cherishing *Mitra* and *Varuṇa*)".

[10] HASKELL, *op. cit.*, p. 58.

[11] SĀYAṆA's Comm., *op. cit.* p. 46-47.

[12] *Taitt. Saṁh.* 3.3.9.1.

the *Phiṭ Sūtra, 'Ghṛtādīnāṁ ca"*.[13] *Sāyaṇa* construes *ṛténa* with the finite verb *āsāthe*, and not with *mitrāvaruṇau*. The mutual expectancy between *ṛténa* and the first vocative (*mitrāvaruṇau*) being absent, the question of *parāṅgavad-bhāva* will not arise here, and so the rule II.1.2. will not operate in this instance.

The second vocative *r.v.* [13a] is unaccented on the strength of Pāṇ. VIII.1.19 though the preceding vocative *m.v.*[13b] is considered non-existent on the authority of the aphorism, *"Āmantritaṁ pūrvam avidyamānavat"*.[14] The term *ṛténa* preceding the first vocative fulfils the condition for the applicability of the *sūtra* VIII.1.19. A similar condition is transparently observed in the Ṛg Vedic passage, *"Imáṁ me gaṅge yamune sarasvati śútudri stómaṁ sacatā páruṣṇyā"*[15] wherein the vocatives *gaṅge* and *yamune* have lost their acute accent on account of their following the pronoun *me*, even though *gaṅge* becomes non-existent as *per* the rule VIII.1.72.

The very next sūtra in the *Aṣṭādhyāyī*, *"Nāmantrite samānādhikaraṇe sāmānya-vacanam"*[16] will debar the previous *sūtra*, i.e. VIII.1.72. in conformity with the grammatical methodology established by PĀṆINI. In the Ṛg Vedic passage under discussion, the first vocative (*m.v.*) is a noun-form (*sāmānya-vacanam*) and the second vocative (*r.v.*) is an adjective (*viśeṣa-vacanam*). Accordingly, the former vocative does not lose its existence on the strength of Pāṇ. VIII.1.73. At this stage, the rule VIII.1.19. operates and it causes the toning down (*nighāta*) of the second vocative. The presence of the previous vocative *m.v.* is itself sufficient to mark the unaccentedness of *r.v.* as required by the rule VIII.1.19. and for this purpose it is unnecessary to proceed backwards to bring in *ṛténa* into this picture.

It is legitimate to question the applicability of Pāṇ. VIII.1.19. at this juncture, since the second vocative, *r.v.* happens to be the first word in the second hemistich. As a matter of fact, the vocative *śútudri* in RV. X.75.5. occurs at the commencement of the second *pāda*, and hence

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13 *Phiṭ Sūtra* 21. *Ghṛta* and the rest are oxytones (end-acute). This is an *Ākṛtigaṇa* : all words which are end-acute, and do not fall under any other rule, should be classified under *ghṛtādi* class. *Ṛténa* : *ṛta* + *ṭā* = *ṛta* + *ina* = *rténa*. The *Guṇa* phoneme is accented by the rule VIII. 2.6 which states that the single substitute of an unaccented vowel with an accented vowel, is *udātta* (*Ekādeśa udāttena udāttaḥ*).

13_a *r.v.* is the abbreviation for *ṛtāvṛdhau*.

13_b *m.v.* is the abbreviation for *mitrāvaruṇau*.

14. Pāṇ. VIII. 1.72 : A preceding vocative is considered as non-existent (for purposes of the accent of the following word).

15 RV. X. 75.5. ab.

16 Pāṇ. VIII. 1.73 : A preceding vocative when it conveys a general idea should not be considered as non-existent, for the purposes of the subsequent vocative, which stands in apposition with the former.

the initial phoneme *u* in *śútudri* receives the acute by VI.1.198. In exactly the same manner, if *r.v.* were to be considered as the first member of the second *pāda*, the first syllable in *r.v.* must be accented.

SĀYAṆA meets the objection raised in the above paragraph by taking resort to Pāṇ. II. 1. 2., and by considering *mitrāvaruṇā–vṛtāvṛdhau* as a *single unit*. In fact, if the first vocative has entered into the body of the second vocative, *r.v.* cannot obviously occur at the beginning of the second hemistich,[17] from the point of view accentuation.

The contention, that the vocative *śútudri* too will not occur as the first word of the second *pāda* in RV. X.75.5.b. by the application of the same rule II.1.2., and thereby the vocative should be unaccented, like *r.v.*, cannot be accepted. It must be remembered that the rule *"Subāmantrite ......svare"* is a *pada-vidhi*, an *interpretationsregel*[18] and as such the *parāṅgavad-bhāva* can operate in places where the relative dependence between the preceding noun-form and the succeeding vocative is directly perceived; in other words, a necessary condition for the applicability of this rule is a connected interrelated sense.[19] In the passage, *"Imáṁ me gaṅge......etc.*, the connected relationship in sense between the third and the fourth vocatives, is absent, because both *sarasvati* and *śútudri* represent the names of two different rivers and of course, these vocatives cannot be taken as a single unit as in RV. I.2.8.ab. But *m.v.* and *r.v.* are in apposition with each other and thus these vocatives carry into effect the basic condition for the operation of the rule II.1.2.[20]

At this stage SĀYAṆA brings into this argument another objection, *viz.* that the first vocative may be treated as the first word of the second *pāda*, as *per* II.1.2. and following this contention, *m.v.* will be unaccented as *per* VIII.1.19. To solve this problem, it can be stated that the *sūtra* II.1.2. is applicable only to the cases where the vocative is preceded by the word ending in a case-termination, as in the example, *márutāṁ pitaḥ*, which has already been mentioned. The rule II.1.2. applies only to the succeeding vocative of the single semantic unit, preceded by the word ending in a *sup*. Thus the unaccentedness of *r.v.* is

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17 *"Subāmantrite....svare," iti parāṅgavad-bhāvena para-anupraveśād eva ṛtāvṛdhau ityasya na pāda-āditvaṁ*, SĀYAṆA, *op. cit.*

18 *Zwei Kapitel der Kācikā* von BRUNO LIEBICH; (1892)., p. 1. Cf. Pāṇ. II.1.1.. (*Samarthaḥ pada-vidhiḥ*) : A rule which relates to complete words (and not to the roots and affixes out of which the words are construed) is to be understood to apply only to those words the sense of which are connected. The rule regarding complete words (*pada-vidhi*) are those relating to (i) *samāsa*, (ii) *vibhakti* and (iii) *parāṅgavadbhāva*. See S. C. VASU's edn. of *Sid. Kaum.* Vol. I., p. 385.

19 *"Parāṅgavad-bhāvas-tāvat subantam āmantritaṁ ca āśritya pravṛtteḥ pada-vidhiḥ"*. SĀYAṆA. *op. cit.*

20 *Prakṛte tu mitrā-varuṇau ṛtāvṛdhau iti dvayorapi sāmānādhikaraṇyena paraspara-anvayād asti sāmarthyam iti bhavitavyaṁ parāṅgavad-bhāvena.* SĀYAṆA, *op. cit.*

justified. By the application of Pāṇ. II.1.2., the first vocable (*m.v.*) is treated as entering into the body of the succeeding word, and *r.v.* loses its *pāda-āditva,* while the unaccentedness of *m.v.* is dependent on the previous word, *ṛténa,* and not on the succeeding vocative. Therefore, the introduction of the rule II.1.2. is considered by SĀYAṆA as an *argumentum ad absurdum,* in this instance.

Finally, it can be said that Pāṇ. II.1.2. and VIII.1.19 relate to *pada-vidhi* and so the interrelationship of sense between the forms *ṛténa* and *m.v.* becomes an essential condition for the application of Pāṇ. VIII.1.19. This being absent, the justification of the grave accent for the first vocative runs on slippery grounds. SĀYAṆA meets this argument thus: "That the interrelationship of the sense between two words is not a condition for the operation of "*Āmantritasya ca*" (VIII.1.19) is proved by the authoritative dictum of the *Vārttika-kāra* — "*Samāna-vākye nighāta-yuṣmad-asmad-ādeśā vaktavyāḥ.*"[21] This *Vārttika* modifies the condition that the two words should form part of the same sentence, which is present in this case. Thus the free application of Pāṇ. VIII.1.19 is unquestionably warranted.[22]

ŚRĪNIVĀSAYAJVAN's arguments:

Commenting on the *Vārttika*: "*Ṣaṣṭhyāmantrita-kāraka-vacanaṁ tan-nimitt-grahaṇaṁ vā*", ŚRINIVĀSAYAJVAN adverts to the opinions of BHAṬṬOJI DIKṢIT and PATAÑJALI regarding the unaccentedness of *r.v.*[23] According to the *vārttika* noted above, the rule II.1.2. should be confined to that word only that denotes the causal agencies (*kāraka*) of the verb with which the vocative is connected, and to the genitive governing the vocative. Or one may revise by mentioning that the rule II.1.2. applies in the case of a word which stands in causal relation to the vocative word.

The author of the *Kaustubha* states that there need not necessarily arise the question of the *tan-nimitta-grahaṇa.* By considering the word *samartha* (interrelation), it is proved that there is no over-application (*ati-prasaṅga-nirāsa*) of the rule in the case of the collocation, "*Ṛténa mitrāvaruṇā......āśāthe*". Since *ṛténa* is construed with *āśāthe,* there is the absence of the mutual expectancy between *ṛténa* and *m.v.* and thus

21 *Vārttika* under Pāṇ. VIII.1.23. The rules relating to *nighāta* (by which all syllables of a word become unaccented such as VIII. 1.19., *etc.*) and to the substitutes of *yuṣmad* and *asmad* apply then only, when the preceding word which would cause the *nighāta* or the substitution, is part of the same sentence with the latter word. See S. C. VASU: *Sid. Kaum.* Vol. I., pp. 229-230.

22 For a summary of SĀYAṆA's arguments see *Veda-Bhāṣya-sāra* by BHAṬṬOJI DIKṢIT, ed. by Pandit R. N. PATANKAR, Bharatiya Vidya Series No. 12. (1947). p. 15.

23 *Svara-siddhānta-candrikā* of ŚRINIVĀSAYAJVAN, ed. by K. A. ŚIVARĀMAKRIṢNA ŚĀSTRI; Ann. Univ. Skt. Series. No. 4. (1936); pp. 309-310.

the extended rule of entering into the body of the following vocative (*parāṅgavad-bhāva*) does not arise at all. If the second alternative *tan-nimitta-grahaṇa* is accepted, the desired *parāṅgavad-bhāva* cannot be had with reference to *m.v.* and *r.v.*

R.v. is derived from the root *vṛdh*, appending the *kvip* suffix (zero morph), denotative of the causal force (*ṇic*) and the term means causing the increase of *ṛta* (*ṛtasya vardhayitārau*).[24] The final syllable in *ṛta* is lengthened by the aphorism, "*Anyeṣāmapi dṛśyate*"[24a]. *M.v.*, the the previous vocative, does not stand in causal relation with the latter phrase. Hence BHAṬṬOJI argues that *m.v.* cannot form part of the latter phrase.

Nor can it be said that *parāṅgavad-bhāva* should not be introduced in this case, for the vocative *r.v.* cannot possess without *parāṅgavad-bhāva* the *nighāta* (unaccentedness) because it occurs at the beginning of the second hemistich as in the case of *śútudri* in RV. X.75.5.

As a matter of fact, the scholiast (*Veda-bhāṣya-kāra*) declared that the second alternative put forth by the above *vārttika* is unnecessary since the *nighāta* of the vocative r.v. can be justified by the *sūtra* II.1.2. and by the first part of the *vārttika*, "*Ṣaṣṭhyāmantritakāraka-vacanam*" itself.[25]

Continuing the above argument of BHAṬṬOJI, the author of the *Svara-siddhānta-candrikā* sums up thus: "By the application of this rule, since the mutual expectancy is present between *m.v.* and *r.v.*, the former enters into the body of the latter for purposes of accentuation. In other words, as the two vocatives, *m.v.* and *r.v.* are taken as a *single semantic unit*, the latter cannot consequently stand at the commencement of the second *pāda*, and it is, therefore, unquestionably unaccented as *per* the rule VIII.2.19".

The *vārttika*, "*Samānadhikaraṇam asamarthavad-bhavati*" will not operate here, as in the instance, '*sarpiḥ-kālaka*' with reference to the rule, "*Isusoḥ sāmarthye*".[26] According to this *vārttika*, two words standing

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[24] *Ṛtasya vardhayitārau ityarthe antar-bhāvita-ṇyarthād vṛdheḥ kvipi 'Anyeṣāmapi dṛśyate' iti pūrva-padasya dīrghe sati 'ṛtāvṛdhau' iti vyutpāditam. Ibid.* p. 310.

[24a] Pāṇ. VI. 3.136; The end-phoneme (*Endlaut*) of a *nighāta* or *avyaya* also (which contains two vowels only) is lengthened in a *mātrā*. See Pāṇ. VI. 3.137. In the *Samhitā* text, the elongation of the *endlaut* of the preceding members is also found in other words. Cf. O. BÖHTLINGK. *Pāṇini's Grammatik* : (1887). p. 351. Cf. ARNOLD : *Vedic Metre*, pp. 123 and 125.

[25] *Ata eva atra Veda-bhāṣya-kāraiḥ api 'tan-nimitta-grahaṇaṁ mā astu, sūtreṇa eva sakala-iṣṭa-siddheḥ' ityuktam.* ŚRINIVĀSAYAJVAN, *op. cit.* p. 310.

[26] Pāṇ. VIII. 3.44. The *visarga* of *is* and *us* optionally changes into *sa* when *ka-varga* or *pa-varga* follows and there is interdependence. Thus *sarpiṣ-karoti etc.* Here *sāmarthya* is interdependence, *i.e.* syntactical relation (*vyapekṣā*).

in apposition with each other should not be taken as interrelated or as constituting the singleness of an idea. But a modification is introduced here, that such words used in apposition with each other and not being of verbal formation cannot be treated as interrelated. As *r.v.* is a verbal formation, the interrelation is warranted. But it cannot be argued that the term, *śútudri* too, should be unaccented, since *parāṅgavad-bhāva* might be had of the previous vocative *sarasvati*, because all these vocatives are construed with the finite verb, *sacata*, and so they do not have interrelation.

If it is argued that *parāṅgavad-bhāva* cannot exist between *m.v.* and *r.v.* since the former vocative is non-existent by the rule VIII.1.72., then it can be answered thus: "This argument cannot hold good. Because the *sūtra* "*Āmantritaṁ pūrvam avidyamānavat*" in fact, applies only when some special grammatical operation is to be applied to the following word and not when the vocative itself is subjected to an operation. This is implied by the word *pūrva* in the *sūtra* itself".

Taking *m.v.* as a part of the following word, is not an operation with reference to the following, but with *m.v.* itself.

Though the interrelation between *ṛténa* and *m.v.* can be established, according to KAIYAṬA, through the finite verb, *āsāthe*, still the direct relation between these two vocatives being absent, the *parāṅgavad-bhāva* might be prevented. Hence the *tan-nimitta-grahaṇa* becomes superfluous.

Accepting *tan-nimitta-grahaṇa*, ŚRINIVĀSAYAJVAN contends that the vocatives, *m.v.* and *r.v.* can be construed with one another and hence the unaccentedness can be justified, because *m.v.* is the reason (cause) for the sense conveyed by *r.v.* (i.e. causing prosperity or righteousness), as in the case of the examples, '*modrāṇāṁ rājan,* or *goṣu svāmin*'.[27] And thus KĀTYĀYANA'S *vārttika* is skilfully interpreted by *Mahābhāṣyakāra* according to whom the unaccentedness of *r.v.* is justified following the axioms of the *Sūtrakārā* and the *Vārttikakāra*. NĀGEŚA, in the *Uddyota*-gloss, discusses this question on the *Mahābhāṣya* under Pāṇ. II.1.2., and ŚRINIVĀSAYAJVAN has carefully followed NĀGEŚA'S views. NĀGEŚA categorically puts forth the view that the word *samartha*, in this and in the previous rules, does not mean mere syntactic relation (*vyapekṣā-sāmarthya*), but *ekārthī-bhāva* (rela-

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27 *Yattu 'tan-nimitta-grahaṇe mitrāvaruṇau ityasya parāṅgavadbhāvaḥ na syāt' ity uktaṁ, tatra kecid āhuḥ: 'Madrāṇāṁ rājan, goṣu svāmin' ityādau rājatva-svāmitvādeḥ pravṛttinimittasya madrādi-nimittakattva-mātreṇa 'Tan-nimitta-grahaṇaṁ vā' iti vārttika-viṣayatvasya Bhāṣyādau pradarśanāt tan-nyāyena ṛtasya vardhanāyāṁ mitrā-varuṇayoḥ nimittattvam āśritya tan-nimitta-grahaṇa-pakṣe api suvacaḥ parāṅgavad-bhāva iti.* ŚRINIVĀSAYAJVAN, *op. cit.*, p. 311.

tion between two members giving rise to the singleness of an idea where one member does not present a systematically-complete-idea in the absence of the other). In the case of *m.v.-r.v.*, the idea presented by one word is syntactically complete in the absence of the other. And thus according to NĀGEŚA, *ekārthī-bhāva-sāmarthya* does not exist. If the rule applies in the case of *vyapekṣā-sāmarthya*, then it would be applicable in the collocation, *'Bho Devadatta'*, where it is not desirable. Therefore, taking into consideration the insufficiency of the *sūtras*, the author of the *vārttikas* makes the new rule which will include cases like *r.v.*[28]

Metrical Evidence:

MADHUCCHANDAS composed the entire hymn in R.V. I.2. in the *Gāyatrī* metre. The *Gāyatrī* stanza, which is the commonest metre in Ṛg Veda, consists of three diameter verses or three octosyllabic verses. "The first two *pādas* of the *Gāyatrī* are treated as a hemistich in the *Saṁhitā* text, probably in imitation of the *Anuṣṭubh* and *Triṣṭubh*", and as MACDONELL observes, "there is no reason to believe that in the original text the second verse was more sharply divided from the third than from the first".[29] OLDENBERG thinks that the traditional division of the *Gāyatrī*, by means of a major break after the second *pāda*, is foreign to the original nature of the verses and further, he considers the break between the first two *pādas* as being neither greater nor smaller than that between the last two. Obviously the traditional *avasāna* (pause) of the *Gāyatrī* is framed in imitation of the pauses of the *Anuṣṭubh, Triṣṭubh, etc.*[30]

ARNOLD arranges the Saṁhitā text of the Ṛg Veda on the basis of metre. Each hymn is assigned by him to one or four successive periods, *viz.* the Bardic period, the Normal period, the Cretic period and the Popular period. The Bardic period is characterised by the originality and rivalry between the antique bardic families, while in the Normal period, the *ṛṣi-kavis* had perfection rather than originality of form, as their aim.[31]

In fact, he attributes the trochaic *Gāyatrī* to the Bardic period, and assigns *Mitrāvaruṇau* to this period. However, he considers the first 30 hymns of the first *maṇḍala* of the Ṛg Veda as belonging to the Normal period.

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[28] PATAÑJALI's *Vyākaraṇa Mahābhāṣya with Kaiyaṭa's Pradīpa and Nāgeśa's Uddyota*; ed. by M. M. Pandit, S. D. KUDALA (1912), pp. 350-352. See p. 352 for NĀGEŚA's gloss.

[29] *A Vedic Grammar for Students*, p. 438. See f.n. 2.

[30] *Die Hymnen des Ṛg Veda* : Band I (Metrische und text-geschichtliche Prolegomena), (1888), p. 23. See p. 3. f.n.

[31] *Vedic Metre in its Historical development;* (1905), pp. 17-18. See p. 48 for the table showing the Homogeneous grouping of the Ṛg Veda.

Further, ARNOLD has shown that "the great mass of *Gāyatrī* hymns in the Ṛg Veda is indistinguishable by characteristics which suggest a later date, and at the same time furnish a transition to the metres of the Popular Ṛg Veda. These characericstics are the growth of the syncopated openings, the increased regularity of the cadence, and the differentiation of the verses according to their positions in the stanza."[32] The *Gāyatrī*, according to the author, appears to be later than the *Anuṣṭubh* and the lyric metres. "This is first suggested by the form of the stanza; for the whole balance of the Indo-European structure of metre is based on duality, and the stanza of three verses seems to be a reduction from the normal stanza of four".[33]

KEITH has rejected ARNOLD's arguments as hypothetical reconstructions.[34] But if the latter's analysis of the Vedic metre in its historical development, were to be pursued *au grand serieux*, it might probably lead us to assume two stages in the development of the Ṛg Vedic *Gāyatrī*, — the first stage (Bardic period) in which the *Gāyatrī* might have appeared with three independent *pādas* and the second stage (Normal period) when the first two *pādas* of the *Gāyatrī* fell together and were treated as a single hemistich. Or perhaps it might even be suggested that "probably soon after the completion of the actual *Brāhmaṇas* when the hymns of the Ṛg Veda were fixed in the phonetic form of the *Saṁhitā* text", the trochaic *Gāyatrī* might have consisted of three independent hemistichs; but, soon after no long interval when ŚAUNAKA constituted the *Pada* text, the first two *pādas* of the *Gāyatrī* were treated as a single hemistich in the *Saṁhitā* text which, in MACDONELL's language "has come down to us without change for about 2500 years".[35] The former or the latter alternative proposal advanced here, cannot be seriously considered unless and until all the hymns composed in the *Gāyatrī* metre in the Ṛg Veda are exhaustively studied and the results tabulated as accurately as possible.

It is remarkably interesting to note that the *Aitareya Brāhamṇa* (7.8.) records that the *prātar-anuvāka* is to be recited by dividing the *ṛk* into two halves (*ardharcasaḥ*).[36] And the *Prātaranuvāka* has verses in the *Gāyatrī* besides six other metres, mentioned in the *Aitareya Brāhmaṇa*. This might invariably lead us to conclude that in the *Brāhmaṇa* period, the division of the *Gāyatrī* into two halves, the first two *pādas*

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32 ARNOLD, *op. cit.*, pp. 171-72.

33 *Ibid.*

34 *Religion and Philosophy of the Veda and the Upanishads.* HOS. Vol. 31. (1925). See p. 3.

35 MACDONELL: *Vedic Grammar*: *Grundriss der Indo-Arischen Philologie und Altertumskunde*; I. Band; 4, Heft. (1910). See Introduction, p. 3.

36 *Ait. Brāh.* Ānandāśrama Edn. Poona. (1896). See p. 212; SĀYAṆA comments: "*Ardharcasaḥ ekaikasmin ṛco 'ardhe' avasāya avasāya prātar-anuvāko anuvācyaḥ*".

presumably forming one unit, and the third *pāda* the second unit, was made for ritualistic purposes.

The solution proper under the current *Pāṇinian* terminology as has been ably demonstrated both by *Sāyaṇa* and *Śrīnivāsayajvan*, lies in construing the first two *pādas* of the *Gāyatrī* in Ṛg Veda I.2.8 ab., as *a single semantic unit*, so that the *pāda–āditva* of the vocative *r.v.* will be relaxed on the principle of accentual variation in relation to semantic significance.[37]

Ṛtāvṛdhau in Corresponding Ṛg Vedic passages:

The system of accentuation for compounds varies from one language to another in the Indo-European. While languages like Lithuanian preserve the accent of the prior member in the determinatives, Vedic Sanskrit, Greek and Latin end-accentuate the determinative compounds.[38] Though in Ṛg Vedic *Tatpuruṣa* compounds like *prajā́-pati* or *gṛhá-pati*, the prior member receives the stress,[39] still the tendency to accent the suffix of the final member appears very prominent. Following BRUGMANN's transpositional theory of the origin of the *Bahuvrīhi* compounds, SANKARAN has pointed out that as this tendency to attach greater importance to the second member than the prior member in the determinatives, came to prevail, the original logical accentuation gradually led up on to oxytonisation of the final member in Sanskrit.[40]

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37 For a fuller discussion on the accentual variation in relation to semantic variation, see C. R. SANKARAN; The Journal of Oriental Research, Madras; Vols. 9 and 10. (1934 and 1935).

38 WOOD : *The Accentuation of Nominal Compounds in Lithuanian*; JLSA. VII. (1930). pp. 16 and 49. Cf. C. R. SANKARAN : *Accentuation in Sanskrit Determinative Compounds.* JOR. Madras. VIII. (1934); p. 136.

39 Pāṇ. VI. 2.18. *"Patyāvaiśvarye"*. In a *Tatpuruṣa* compound ending in *–pati* when it means 'master or lord', the first member preserves its original accent. Cf. J. KURYLOWICZ: *L'accentuation des langue Indo-Européennes.* (1958). chapitre I, p. 81. *"Dans le RV. ces composes sont accentues sur le premier membre 22 exemples avec* –pati". Also cf. WACKERNAGEL: *Altindische Grammatik* II. i. sections 17 and 103.

40 C. R. SANKARAN : *op. cit.* see p. 137. Also see the author's conclusions in the article *"Five stages of Pre-Vedic Determinative-Compound-Accentuation as surmised by the Historical survivals of their representatives in Sanskrit"*; JOR. Madras, Vol. IX, Part II, (1936), pp. 129-131.
Note : SANKARAN's explanation regarding the shift of importance from the prior member to the latter member in Determinatives, has to be re-examined, since one cannot say that in *gṛhá–pati*, the first member of the compound is more important than the second, and in *rayi–páti* the second member is given greater stress than the first, in meaning. The same is true of *Bahuvrīhi* compounds in which both members of the compound surrender themselves to a third word.
Cf. J. KURYLOWICZ : *op. cit.*, p. 81. *"Le second membre porte l'accent, sur la premiere syllable, dans rayi–páti etc."*
Also Cf. S. S. BHAWE : *Interpretation of some Ṛg–Vedic Compounds.* "The phenomenon of accent-shift in case of the same word changing its meaning is available in the Vedic language", p. 329, JOR. Baroda, Vol. IV, No. 4, (1955).

In the Ṛg Veda, there are 19 occurrences in which *ṛtāvṛdhaḥ* retains the *Tatpuruṣa* compound accent,[41] and in about four cases, the end-accentuation of *ṛtāvṛdhā* is maintained.[41-a] The Atharva Veda has three examples for the accentuation of the final member in the compound *ṛtāvṛdhaḥ*.[42]

Of the vocative, *r.v.*, not standing at the beginning of a *pāda*, but always occuring at the end, and therefore unaccented, the RV. has eight examples,[43] while the Atharvan has but one example.[43-a] It is noteworthy, however, that *ṛta-vṛdh* always occurs at the end of the *pāda* except in two cases, *viz.* RV. I 2.8 ab. and VI.50.14 a.[44] In the former instance, the *pāda–āditva* is denied as has already been pointed out both by SĀYAṆA and ŚRINIVĀSAYAJVAN, on the basis of the semantic accentuation justified by Pāṇ. II.1.2., and in the latter instance, *ṛta–vṛdhaḥ* occurs in the medial position.

Conclusion :

The foregoing analysis of the unaccentedness of *ṛtā-vṛdhau* in RV. I.2.8. as demonstrated by the Indian scholiasts *cum Vaiyākaraṇas*, in the light of the *Muni-traya* grammatical procedures, remarkably reveals that the Pāṇinian methodology, which breaks sometimes, from the domain of Historical Linguistics in Sanskrit, still holds the field of Vedic accentuation. Though THIEME is tempted to remark that "the written accents are an invention of a comparatively young age and they cannot have been put by the redactors or *Pada-kāras*",[45] he has candidly admitted that PĀṆINI shows step by step that he was intimately associated with a number of *Saṁhitās* which we know,[45-a] and that "in later times, *Pāṇini's*

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41 RV. I. 13.6; 14.7; 44.14; 142.6; V. 44.4. VI. 15. 18. VI. 50.14; 52.10; VII. 66.10; 13; 82.10; 83.10; VIII. 89.1; IX. 42.5; 102.6; X. 16.11; 65.7; 66.1; 145.4.

41-a RV. 7.106.3; 159.1; V. 65.2; IX. 9.3.

42 "*Satya-sandhān ṛtāvṛdhaḥ*". AV. XI. 6.19 ab. and XI. 6.20 ab. *Vide, Atharva-Veda Saṁhitā* by ROTH and WHITNEY. (1924).
"*Ṛtajātā ṛtāvṛdhaḥ*". AV. XVIII. 2.15 a.

43 The refrain "*Pātáṁ sómam ṛtā–vṛdhā*" occurs in the following hymns :

Number.	*Devatā.*	*Metre.*
I. 47.3.b.	*Aśvins*	*Bṛhatī*
I.47.5.d.	"	"
VIII. 87.5.d.	"	"
III. 62.18.d.	*Mitrā-Varuṇau*	*Gāyatrī*
VII. 66.19.d.	" "	"

"*Sutáḥ śoma ṛtā–vṛdhā*": I. 47.1.b. and II. 41.4.b.
"*Puṣá naḥ pātu duritād–ṛtāvṛdho....*" VI. 75.10.c.

43-a "*Manvé vāṁ mitrāvaruṇāvṛdhau....*" AV. IV. 29.1.

44 Cf. LÜDERS: *Varuṇa*. p. 567. "*Víśve–deváḥ ṛtāvṛdho huvānā........*". R.V. VI. 50.14.c.

45 *Pāṇini and the Veda*; (1935), pp. 129-130.

45-a *op. cit.* Introduction; p. xiii.

Vedic rules become veritable step-children of the grammatical interpretation."[45_b]

The author of the *Svara-siddhānta-candrikā* has stressed the importance of accent, in a somewhat exaggerated tone thus : "Just as the entire Veda solely stands for the glorification of the 'One-and-Only-*Brahman*-without-a-second, the Science of *Vyākaraṇa* exists for the exemplification of the system of accentuation".[46] This shows that accent is the *soul* of Sanskrit Grammar. "A study of the accent-rules of *Pāṇini*, even where they appear to be unacceptable, would lead us to a better understanding of the Veda, because these rules portray an accurate if not a faithful picture of the entire phenomena of the Vedic language".[47]

45_b THIEME: *op. cit.*, p. xi.

46 "*Kiṁ bahunā, śrutir–akhilā Brahma–Advaita–eka–tat–parā /*
Tadvad–vyākṛtir–akhilā Svara–bodha–eka–prayojanā jayati //

47 S. S. BHAWE: *op. cit.*, p. 329.

THE POTTER'S TECHNIQUE IN PROTO-HISTORIC AHAR

by

S. B. DEO

Ahar, a suburb of Udaipur, in Rajasthan was excavated last season by the Deccan College Postgraduate and Research Institute, Poona, and the University of Poona with the collaboration of the Government of Rajasthan and the University of Melbourne, Australia. This site was first excavated by the Department of Archaeology of the Rajasthan Government. This dig was of an exploratory nature which helped to establish the rich potency of the habitational deposits of about 37 ft. divided into three phases. It also brought to light a fair bulk of the black-and-red pottery painted in dull white.

Similar pottery was encountered in the lowest phase of Navdatoli, a Chalcolithic settlement on the bank of the Narmada in Madhya Pradesh. Fortunately this ceramic industry could be assigned to about 17th century B.C. with the help of the Carbon-14 dating. On this basis the earliest settlements at Ahar may be put at about 2000 B.C. or even earlier, until a more precise period for it is available as a result of the application of the same method to Ahar remains.[1]

Apart from the antiquity, the pottery from Ahar has one more factor which justified a detailed study. The black-and-red ware as also several others were found associated with the material remains of a people who had the knowledge of smelting copper locally, but had no stone tools. As such, they could be fittingly designated as belonging to the 'copper age' rather than "Chalcolithic". This cultural distinction in addition to the early date of its existence lends a sort of a uniqueness to the pottery from Ahar.

So far, the pottery from several sites has been studied mostly from the point of view of shapes and forms, as that was the basis for the observations by the archaeologists regarding culture contacts, continuities or overlaps. Besides doing this, the Ahar pottery throws a lot of light on the techniques of the potter in several fabrics. This paper intends to take into consideration such specimens as have helped in knowing the art of the potter.[2]

1 The C14 date for Ahar has come to be 1885 B.C. according to TIFR, B'bay.

2 Dr. Allchin's study of Piklihal pottery, has, as is agreed, helped considerably in knowing the potter's technique in the Neolithic and post-Neolithic phases at Piklihal.

The pottery from Ahar yielded valuable information on the various fabrics, the techniques of making different shapes, the surface treatment, methods of firing and techniques of decorations. In dealing with these, the function and relation of shape with the technique of make up will also be referred to wherever necessary and possible.

The Fabrics :

The pottery from Ahar resolved itself into two basic groups viz. the red and the black. The application of slip and the method of firing, however, turned out several sub-divisions amongst these two. For instance, such pots as were fired inversely resulted in the combination of these two colours in one and the same vessel having a red outer bottom, and the rim and inner surface black. These have been called the black-and-red ware. In some cases, the firing, though executed in the inversed way, was not congenial to full oxydization with the result that such pots turned black and blotchy grey in parts. The grey ware represents a stage in which the kiln did allow neither full oxydization nor complete non-oxydization. On the other hand, the relative abundance of the red ware over the rest suggests the greater adoption of the open kiln than the closed one.

The appearance of a vessel depended also on the reaction of the constituents of the slip to the nature of firing. For instance, at Ahar several pots were encountered in which the slip showed various shades of red like tan, orange, brown, chocolate, almond etc. Even in the red itself, sometimes there was a group which had a bright red slip while some had less bright red. This was not necessarily the result of burnishing which gives lustre rather than enhances the original tone of the colour of the slip. Ahar had all these three categories, viz. pottery with deep red slip, that with a red slip highly burnished and hence glossy and that with a dull red slip.

Besides the burnishing and the constituents of the slip, some pots were such as showed a blotchy surface due to the reaction of the slip to the firing. For instance, the cream slipped pottery occurring in the earliest phase of occupation did not present a uniformly cream-yellow surface in all the cases. Some sherds, as at Navdatoli, do show a variety in the tones of the yellowish colour of the slip, like deep yellowish creamy, pale whitish creamy etc. Along with this, a single type of cream slip seems to have resulted in delicate merging of orange and cream slips on some sherds, while some show patches of these two.

It will thus be apparent that though basically the pottery from Ahar could be resolved into two groups, this did not suffice. For the variations in the colour of the pot or its surface was rather an elusive factor for a final classification which had to take into considerdtion other

aspects, especially the clay used and the method of making. Ahar pottery threw a welcome light on these features too. Save a few, majority of the ceramic fabrics at Ahar showed that the clay was mixed with hey, fine sand and possibly ash. This practice continues even to this day in the area around Udaipur. However, the finer fabrics like the almond slipped, the red slipped with stoney core and the ware with chocolate slip showed the use of a pure clay devoid of any degraissant, turned either red or grey in firing. Such wares occurring mostly in the middle phase were few possibly because of the high grade clay involving elaborate process of purification and the resultant cost of production. It may also be added here that such a clay was used for quality wares mentioned above, having distinct shapes like storage jars with corrugated necks and shoulders, dish-on-stand, stepped dishes (also on stands), rather than the usual bowls and basins.

The usual ingredients like ash, hay and sand were further supplanted in the last phase of the copper age at Ahar, by the mix of husk of various grains in clay. [Pl. I, Nos. 1-4]. These have yet to be identified. But careful observation showed that some kind of wheat and rice husk were definitely utilised along with that of a small round grain. On inquiries, the local potter identified it as a kind of wild grass seed which the cattle eat at present in the region around Udaipur, though not used in pottery-making now.

The Techniques :

Then main fabrics and their sub-varieties and corollaries gave a lot of information about the techniques of fashioning various shapes. These have shown that the Ahar potter used the hand, the wheel, as also both, for turning out certain pots.

The use of the hand only was evidenced in the making up of heavy storage jars the inner surface of which showed either finger depressions or the concentric ridges as a result of the joint of a pair of clay rings kept one above the other. So far as the outer surface was concerned, such marks could not be distinguished, due to the proper finishing of the surface. On the other hand dough plates were fashioned by expanding a clay lump with the pressure of the palm of the hand as the inner surface in some specimens evidenced.[3] To this, a clay ring was attached around the periphery as the thick joint at the base of the ring and the edges of the plate showed.

The use of the hand attained a secondary importance when pots were fashioned in moulds. In such a case the outer surface of the pot

[3] The pantis with flared sides and open month were cut off from the clay lump on the wheel with the help of a thread. [pl. II, No. 11].

gets a smooth finish but the interior is very uneven due to the pressing of the clay against the mould. However, none of the shapes at Ahar showed the use of mould.

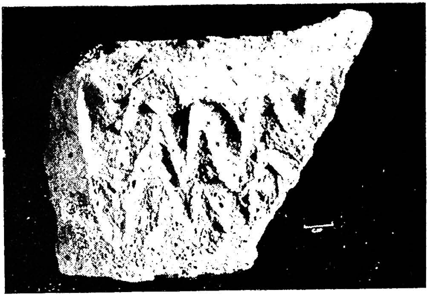
The combination of the hand and the wheel was evidenced in several shapes at Ahar. For instance, the rimless bowls, the globular pots with sloping shoulders, the dish-on-stand and the basins showed that some parts of these vessels were wheel-made while some hand-made or dabbered to requisite shape. It was believed so far that the rimless bowls were possibly made entirely on the wheel. However, the Ahar bowls whether of the black-and-red or red-slipped fabrics showed that the upper rings were wheel-fashioned and then luted smoothly to the lower portion which was heavily scooped or dabbered. The evidence for scooping of the inner and outer surfaces of bowls was available in all the phases at Ahar. A close examination of the scoop marks showed that either bamboo strips [Pl. II, No. 9] or a bunch of grass, [Pl. I, Nos. 5-8] was used.

Similar was the case of globular pots. These were fashioned on wheel so far as the portion upto the shoulder and were tagged on to the globular belly with round bottom, as evidenced by the striation marks. The lower portion was invariably made either elongated and then dabbered to round shape or in a mould which was nothing but the lower half of a similar but broken vessel. It may be noted that such moulds of broken vessels are even now used by the potters in Rajasthan and Central India. Similar technique seems to have been adopted in globular pots with high necks — only the latter were fabricated on wheels and then luted to the body. [Pl. II, No. 10].

The dish-on-stand or bowl-on-stand though entirely fashioned on wheel seems to have been made in parts, viz. the upper dish, the cylindrical stem and the flared or stepped base. All these three parts show close and parallel striations. The dish and the base were luted to the stem later on when the pieces were in leather-hard condition. The top of the stem and the centre of the outer base of the dish were roughened by incised squares so that they may get interlocked and fix properly. When this was done, then the portion was covered with clay and the parts luted. Similar was the technique in fixing the knob-hold to a lid with convex bottom. This also explains the breakage of these vessels at the points of luting.

The Surface treatment :

Reference has already been made to the application of different kinds of slips and their reaction to firing methods. Besides the slips, the pottery from Ahar was distinguished by a large percentage of burnished wares which in some cases attained a high lustre. It is not possible to say how the potter attained it on his product.



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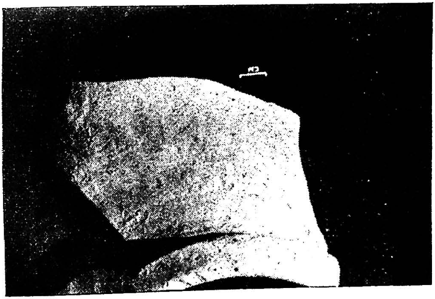

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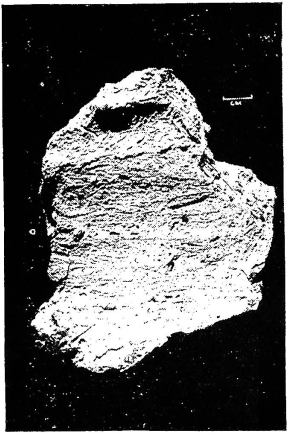

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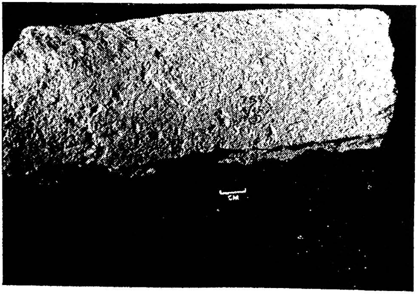

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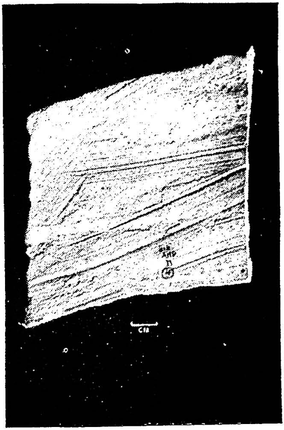

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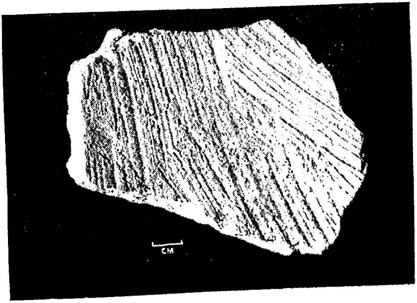

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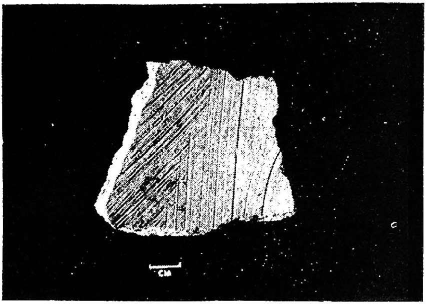

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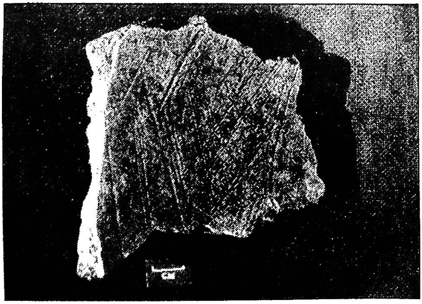

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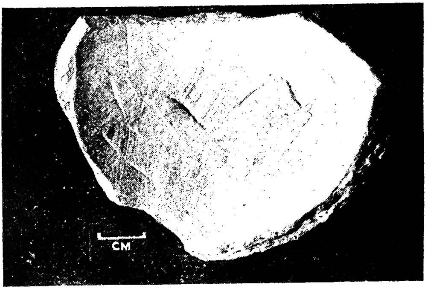

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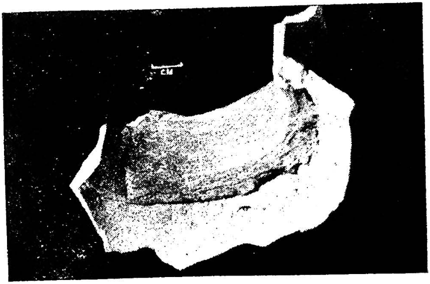

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PLATE II

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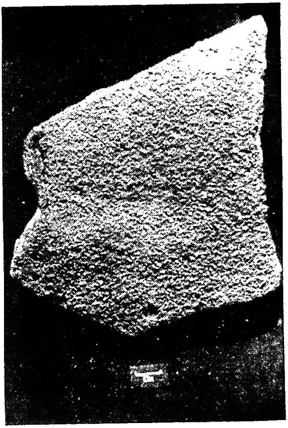

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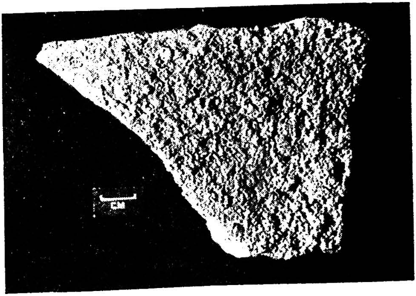

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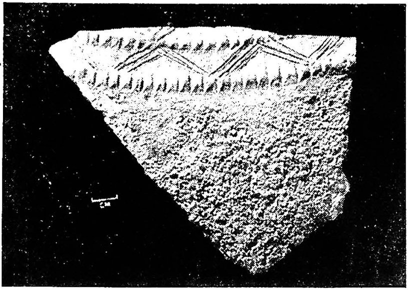

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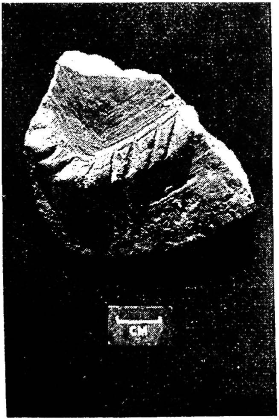

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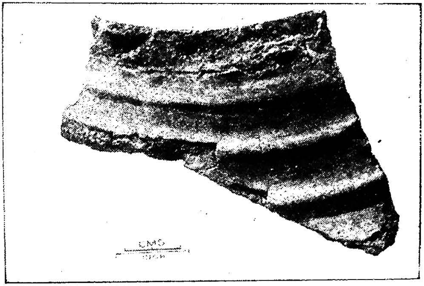

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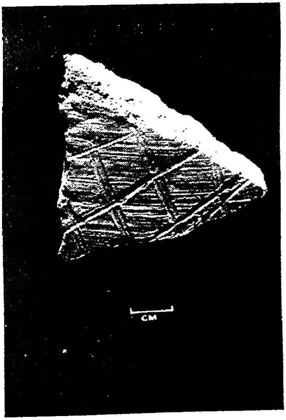

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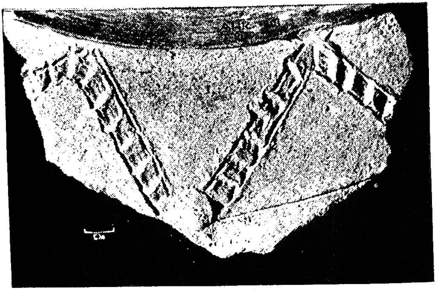

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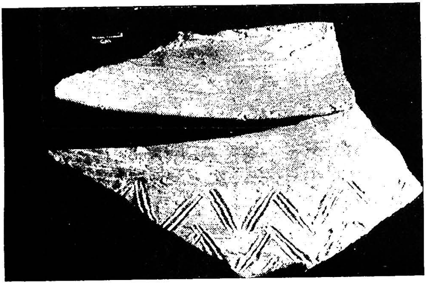

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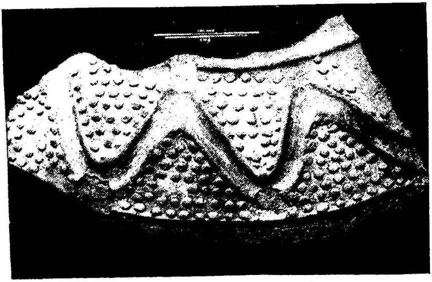

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PLATE III

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It is well known that the wash and the slip, especially the latter, are applied to a pot for better appearance as also for filling up the grass or sand marks. The wash being of a very thin consistency is not sufficient for this purpose. However, the slip being thicker than the wash helps more towards this purpose. The Ahar potter seems to have been conscious of this as is evidenced by the fact that the majority of the wares bear a thick slip, the wares with a simple thin wash being restricted mostly to the early historic period. That the application of the slip was a patent device of surface treatment in the copper age is further corroborated by the fact that even the black-and-red burnished pottery had a kind of brown-red slip in several specimens, a feature unknown so far either in the contemporary or posterior ceramic industries detected elsewhere.

Surface Decorations :

The conscious efforts to present a better surface resulted in various ways and means of doing it. The Ahar pottery decorative methods and patterns show a unique exuberance of ornamentation, a feature reflected in the costumes and ornaments of the local rural populace.

The decorations comprised applique, cut, incised and punctured patterns. In several cases, all these could be had on a single pot.

The Ahar pottery showed that the area of decoration was selected with full knowledge either of the use or the shape of the pot. For instance, huge storage jars and possibly globular pots used for lesser storage purposes were decorated only upto the shoulder, the lower portions being left coarse or deliberately made rough by the application of sand. [Pl. II, Nos. 12-16; Pl. III, No. 22]. It was surmised from this fact that such pots were kept embedded into the floor of a house upto the belly so that the decorated portion remained visible.

The aplique decorations consisted of either wavy bands, concentric bands around the shoulder and neck or small roundels. The first were found associated mostly with huge storage jars having high and broad necks in red slipped ware. In some cases the surfaces were decorated with applique bands which were wavy and were supplemented by a number of small applique roundels and pointed knobs. [Pl. III, Nos. 21, 23]. This was repeated even in the grey slipped ware. These applique bands and roundels were so thick that in some cases they had peeled off, exposing the original surface. [Pl. III, No. 17]. In the case of globular pots in grey ware, applique bands, roundels and incised slanting lines, all went together. As required, the area bearing such decorations was thickened by the application of slip, [Pl. III, No. 17], while the undecorated portion of the belly and the bottom were extremely thin and gave way easily.

The applique, incised and punctured decorations came mostly from the horizons of Phase II. That the roundels or bands were executed

with fingers was evident from the finger impressions on these. The slanting incised lines were possibly drawn with the help of a sharp bamboo strip as the interiors of these channels left their impressions. [Pl. III, No. 23] In most cases the lines were drawn by such a sharp tool about two millimetres broad and executed downwards, with the pressure on the instrument increasing as the line came downwards. This was evidenced by the fineness and shallowness of the incised line at the top and its broadening and deepening at the lower end.

The punctured and cut varieties of decoration at Ahar were also remarkable. In the case of the former, two main varieties could be noticed. Either the applique roundel was punctured in the centre with the help of possibly a grass stalk about one millimetre in diameter, or independent circles were impressed with a hollow tube five to six millimetres in diameter. Both these occurred on globular pots in grey-slipped fabric having applique roundel. The cut decoration also showed two varieties. In the case of globular pots with sloping shoulders, an applique band was cut in such a way that the final effect was that of a cog-wheel with sharp pointed teeth. It was not necessarily the case that such cuttings were regular but that they were chipped off from both the sides rather than in a single attempt is evident from the effects of the cutting process left on the applique band. The band was chipped off slantingly in some cases with bamboo strips while the clay was still wet as the impressions showed. [Pl. III, No. 19].

In spite of a wide variety of techniques of decoration, the latter hardly crossed the orbit of geometrical patterns. Slanting lines, diamonds, hatched triangles and applique straight or wavy bands were the only decorations found on Ahar pottery. Moreover, this tendency of decoration by such devices seems to have been more in vogue in the middle phase of occupation. [Pl. III, Nos. 18-21]

The large number of painted sherds occurring in all the three phases were mainly of three types; painted dull white on black-and-red. painted black-on-red and painted black on cream or buff. The second less in number, is restricted to the top-most phase, while the third is the minimum and came from the earliest phase. In all these cases the painting is pre-firing and geometrical. In the case of the black-and-red, the thickness of the white paint can be felt by hand; in the case of the second ware, it cannot be. In the former, in pieces of uneven firing, the dull white becomes insignificant over a reddish surface. For want of analysis, the constituents of the colour cannot be explained.

It is not possible to say how the painting was executed. It may be that some sort of a brush or bamboo splinter with pounded tip might have been used. The remarkable evenness of thickness of bands and parallel symmetry of slanting lines show that the artist knew how to keep to

the uniformity of the tip of the painting apparatus by proper and even pressure. Some sherds show delicate split ends of strokes, some excess of paint at the point of beginning (as in a spiral design), and some extra quantity of paint splashed in drops on the body of the pot which might point to such an apparatus of painting which was not able to withhold the excess quantity.

The patterns of decoration, as said above, were mainly geometrical. However, amongst these, it was found that the dot decoration of chevrons was confined only to the topmost phase while the bands, spirals and groups of lines occurred throughout.

In addition to the usual forms of decoration listed above, the ancient potter of Ahar utilised a very skilful device in the very process of firing. Some globular pots of entirely red fabric bore a black spot on the belly. Such spots were found to be perfectly circular, with a diameter of about four inches. This could be achieved by not allowing that much area to come in contact with oxygen in the firing process. The resultant black looked beautiful against the rest of the bright red surface. This shows that the potter knew the skilful arrangement of pots in the kiln.

A study of the protohistoric ceramic industry as evidenced by the excavations at Ahar has thus helped in throwing light on the techniques used in the make up of various fabrics, shapes and decorations. A similar study of pottery from other sites might help in knowing the extent of similar technical traditions in India.

A NOTE ON THE EARLY HISTORY OF FLAX

by
A. N. GULATI

Use of flax or fibre from the linseed plant is so ancient and widespread that flax appears to be one of the oldest, if not the oldest textile fibre. Archaeologically its use is traceable to Swiss Lake Dwellers of prehistoric times (10,000 to 12,000 years ago) and to Egyptian mummy cloth (3,000 B.C.). WELLS writing about the people called Lake Dwellers stated. "In Switzerland they lived in lake villages, built on platforms supported

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[In March 1961 Dr. S. B. Deo and Dr. Z. D. Ansari had conducted a small excavation at Chandoli, which is situated about 48 miles to the north of Poona in the same district. It is situated on the left bank of the Ghod river. The habitation deposit is small, about 4 feet. However, this shallow deposit yielded very interesting finds: pots and burials of Nevasa-Jorwe type, an identical stone blade and polished stone industry, a copper celt and in addition pots and fabrics of Navdatoli (Malwa) type. Hitherto five Carbon-14 determinations have been made; three by the University of Pennsylvania and two by the Tata Institute of Fundamental Research, Bombay. These definitely indicate that the Chandoli Chalcolithic Culture goes back to about 1300 B.C.

In one of the urns used for a child-burial was found a copper-bead necklace with the central bead of carnelian. The thread seemed to have remained intact in the undisturbed portion of the necklace. So the necklace was immediately embedded in thin wax solution. Later this portion was sent to Dr. Moti Chandra, Director of the Prince of Wales Museum, Bombay, who handed it over to Dr. Gulati, an expert on the identification of old textile fibres. It may be recalled that Dr. Gulati had previously examined the thread of a copper-bead necklace found in a similar context at Nevasa and identified it as silk with a nep of cotton. Now, the thread of the Chandoli necklace he identifies as flax. This is interesting and important for two reasons: First, it carries back the antiquity of flax in India, as shown by him. Secondly, linseed occurs at Navdatoli in the earliest deposits, now dated by Carbon-14 method to 1791 B.C. Further, pottery of Navdatoli type and fabric occurs at Chandoli. Thus one can venture to say that these two cultures were intimately related.]

H.D.S.

by "piles" driven into the bottom of the lake or into the soil close to its edge." He called them Planting People, who grew corn, which formed a part of their food, and further stated, "The Planting People dressed themselves chiefly in skins, but they also wove flax and made it into coarse cloth. Their nets were also made of flax"[1]

MAUERSBERGER stated, "The Phoenicians are thought to have dispersed their information (about manufacture of flax cloth) as they extended their trade routes around the Mediterranean and up the west coast of Gaul to Britain, several centuries before the Christian Era. One of the principal items in Phoenician trade was fine linen from Egypt."[2]

The Aryans are considered to have entered India some time after 2,000 B.C. from Central Asia, where they were already cultivating a number of cereals, and brought the art of agriculture with them. If they brought linseed cultivation with them to India, it is not unlikely that they brought also the art of preparing flax fibre from the stem of the linseed plant. If so, did they use it in India, and for how long before they discontinued it, are questions which need further research. Cultivation of linseed was known in India when *Kautilya Arthsastra* was written in 300 B.C.[3] as indicated by RAYCHAUDHARI.[4]

Laws of Manu [Trans. by Max Müller, 1886] contain the following references[5] to the use of fibres in second Chapter.

> Verse 42. "The girdle of a *Brahman* shall consist of a triple cord of *Munga* grass smooth and soft; that of *Kshatriya* of a bow string made of *Mûrva* fibres (*Sansviera Roxburghiana*, M. Monier Williams, Sanskrit English Dictionary); that of *Vaisya* of hempen threads."
>
> Verse 43. "If *munga* grass (and so forth) be not procurable, the girdle may be made of *Kusa, Ashmantaka* (fibre from *Kovidar* tree, *Chinar* according to Hindi Kosh) and *Balbaga* (fibres from the leaves of *Anona reticulata* or *squamosa*) or (*Trigonella Foenum Graccum*, a kind of *Musa* or plantain) with a single three-fold knot, or with three or five knots according to custom of the family."

Note : Notes included in parenthesis are introduced by the present writer.

> Verse 44. "The sacrificial string of a brahman shall be made of cotton, shall be twisted to the right, consist of three threads, that of *Kshatriya* hempen threads, and that of a *Vaisya* of woollen threads."

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1 WELLS, H.G., *The Junior Outline of History*, Dennis Archer, London, 1932, pp. 35-35.
2 MATHEWS, *Textile Fibres*, (6th Ed.), p. 283.
3 KEITH, *History of Sanskrit Literature*, (1928), p. 461.
4 RAYCHAUDHARI, S.P., *Science and Culture*, Vol. VII, No. 1, (1941), pp. 10-17.
5 Translated by Max Muller (1886).

Linen is mentioned in this work in Chapter V, verse 120, which deals with the washing methods and reads as under :—

"Silk and woollen stuffs be washed with alkaline earth, blankets with pounded *Arishta* (soap nut), *Amsupattas* with bel fruit, linen with paste of yellow mustard".

WATTERS[6] described among the four groups of dress material used by Indians in that period, *Kshauma* or linen under the second group, which comprises fabrics made from *kshauma* or flax, *saná* or jute and the *bhanga* or hemp. The three plants yield fibres from which clothes are made.

These references show that some bast fibres were employed for making strings and cloth about 800 B.C. (*Manu's Laws*) and in Buddhistic India. One could not, however, take a bet that *kshauma* was definitely flax and not ramie, which had a similar name (*chauma* in China). Again, one could not further be certain if what one reads in *Manu's Laws* was not added later on, since it was written actually at a much later age, and was passed on by word of mouth for a long time earlier. Although samples of *bhāṅga* or hemp cloth made in Garhwal District of Himachal Pradesh should be easily available among modern cottage industries, or at least in anthropological collections, and any number of jute fabrics are now available, no flax cloth or string made or found in India has so far been described.

Apparently the first sample of this kind comes from excavations made at Chandoli, about 48 miles north of Poona, near Manchar. This sample was referred to the writer by Prof. H. D. SANKALIA of Deccan College, Poona through a common friend Dr. MOTICHANDRA, a well known authority on ancient Indian Textiles. The following is an account of the observations made on this sample by the writer.

The sample consisted of four sets of copper beads, which were larger in two of these sets than in the two other sets. The larger beads were 4 to 5 mm. long, while the smaller ones were practically of half the size. These beads were found in the burial of a child kept in an earthen pot. This particular deposit dates back to 1500 B.C. according to carbon-14 radio-activity method of determining the age of old materials. The beads are possibly from the same necklace, and therefore, the smaller beads are from the ends and the larger ones from the centre of the necklace, as is even seen in modern arrangements of beads in necklaces.

The string could not be seen with the naked eye except at the end of one of the larger bead sets, where some projecting fibres appeared to be covered with a hyaline coat of crystalline matter. The beads in each

6 *On Yuan Chwang* (629-645 A.D.), tr. by Thomas, Royal Asiatic Society, London, Vol. I.

set were held together by the combined action of bluish green rust, cubical and needle shaped crystals and mud. A junction between two beads was carefully exposed by dissecting out the mud and scraping the crystals. Fibrous matter which had gone bluish in colour could not hold the adjacent beads together, so that the exposed bead fell apart from the set under observation. These fibre ends were not covered by crystalline matter. These as well as those covered by a crystalline film were examined microscopically. The following points were noted.

1. The string threaded through the beads was extremely tendered. The exposed fibre bits were tinted blue.
2. The crystalline film on fibre ends was not soluble in water, but was quickly dissolved away in caustic soda solution, suggesting that the crystalline formation was in all probability cupric hydroxide, a fact which was also indicated by the bluish colour imparted by it to the fibres. Ammonia was not tried on the fibre bits covered with crystalline matter for fear of dissolving them in the resultant chemical called cuprammonium hydroxide.
3. The reclaimed fibre bits from inside the beads were not derived from single celled fibres, but were from bundles of fibres as occur in bast fibre strands. Each fibre in the composite piece had a distinct lumen or canal indicating that the material was of vegetable origin, and some kind of a bast fibre.
4. A number of small pieces had to be examined before the intact ends of fibre cells were located. Obviously each fibre cell was not very short as is the case in jute, the fibre bits examined being of the order of 1 to 2 mm. in length, and intact fibre cells in jute strands vary from 1.5 to 5 mm. in length.
5. The fibre bits had clear X-shaped dislocation markings in each fibre cells, indicating that the fibre in question was either flax, real hemp, sann hemp or ramie. If full length fibre cells were available, further differentiation would have been fairly easy. Unfortunately such was not the case. The length of the fibres had to be estimated indirectly. The following assumption was employed to arrive at the required estimate. Each cell has two ends, and therefore, there cannot be more ends than twice the number of fibre cells in an average length of fibre cells known for each or the above four types of bast fibres.
6. The fibre bits of the available present material, which are shown in figure 1, had an average length of about a millimeter. Each fibre bit had on an average portions of 12 fibre cells. Thus the composite length of each bit was about 12 mm. Intact ends of fibres were observed at the rate of two per three bits, so that two ends occurred per 36 mm. of composite fibre length. Length of fibre cells varies as under in the above named four types of bast fibres.

Ramie	60 to 250 mm,
Flax	20 to 50 mm,

Real Hemp (*Cannabis indica*) 15 to 40 mm,
Sann Hemp (*Crotalaria juncea*) 9 to 20 mm.

If the above assumption is correct, which it looks to be, the present material is either derived from flax or real hemp.

7. Fibre diameter was then measured. The data were collected, using No. 10 eyepiece and 45 objective on a Leitz microscope.

1.	8.0 dn	6.	6.0 dn	11.	4.5 dn	16.	6.2 dn	21.	4.2 dn
2.	5.2	7.	7.0	12.	6.5	17.	6.5	22.	8.0
3.	5.3	8.	4.0	13.	5.5	18.	8.5	23.	6.2
4.	4.3	9.	5.2	14.	4.0	19.	8.5	24.	5.0
5.	6.6	10.	7.5	15.	5.5	20.	2.6	25.	5.2
Total	29.4		29.7		26.0		32.3		28.6

Grand Total = 146.0; Average = 146 ÷ 25 = 5.84 dns.

Each division = 3.16 microns. Therefore average diameter of fibre cells = 18.45 microns.

Now the diameter of the fibre cells is known to vary as under among the above named bast fibres.

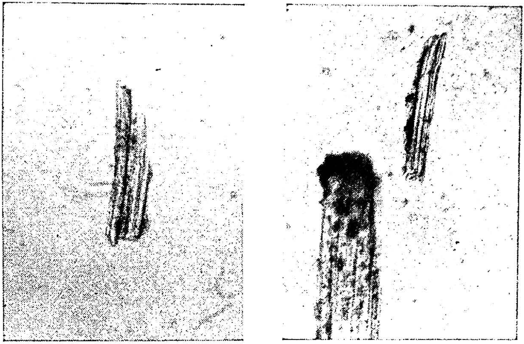
Ramie	50	25 to 75
Flax	20	12 to 30
Real Hemp	22	16 to 50
Sann Hemp	29	25 to 50

Comparison of the actual measurements with the values given above, show that the fibres of the present material are nearer flax than the other three bast fibres.

8. The shape of the fibre ends was next studied. The drawings shown in Figure II were obtained and compared with those shown in text books (Mathews' Textile Fibres, 6th Edition, J. Wiley, New York) and those observed by the writer years ago.

The above comparison clearly shows the affinity of the present fibres with flax again, since the ends are gradually tapering and are neither spatulate as in hemp nor bifurcating as in Sann hemp sometime nor tapering to a needle point as in ramie.

9. The present material further differed from ramie in the shape of dislocations in fibre-cell structure, which are compared below in Figure III.



(FIBRE BITS FROM INSIDE COPPER BEADS)

Figure 1

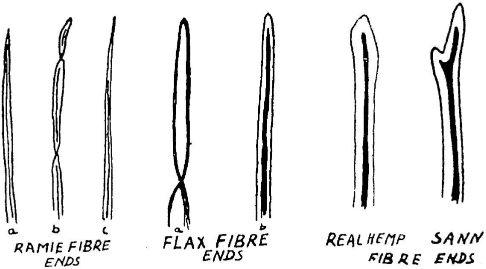
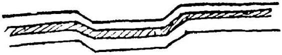


FIGURE II

a. A BEND IN THE PRESENT
'FIBRE MATERIAL



b A DISLOCATION BEND
IN RAMIE FIBRE

Figure III

The above comparisons hardly leave any doubt that the present material is flax; but how it came to the site it was found in, and its association with the existing civilization in the country will have to be determined otherwise. If the Aryans had reached the site by 1500 B.C., and manufactured flax from linseed, it will be an exciting find.

Acknowledgement :

The writer is thankful to Dr. R. L. N. IYENGAR for allowing him to examine this material at the Technological Laboratory of the Indian Central Cotton Committee, and Dr. BETRABET for assisting me in photographing the material.

ETHNIC AFFINITIES OF RAJPUTS OF PAURI GARHWAL (UTTAR PRADESH)*

by

R. K. GULATI

Introduction :

History plays an important role in the Anthropological studies as it shows the effect of one culture upon another. On this earth no area can be static and the changes are brought about by the coming into contact of different kinds of people. Garhwal though a hilly tract and not so easily accessible has also been affected. The different migrations of people that took place and the invasions of the neighbours like Gurkhas have changed the ethnic position of Garhwal altogether. The different cultures and the physical types have stayed there and have left their impress.

The people of Garhwal, it is evident from the history, were invaded by the Kumaonis and Gurkhas from Nepal, and hence different bloods mixed giving rise to different physical types. It is always essential to study the past history if ethnic affiliations of a people are to be understood.

The material for reconstruction of a connected history of Garhwal is scanty, vague and ill authenticated. But some light has been shed on it by scholars.

Garhwal is a northern hilly district in the Uttar Pradesh. British Garhwal and Tehri Garhwal are separated by the Alaknanda river.

The Rajputs were also called Khasiyas and according to ATKINSON "Khasiyas were like Nagas, a very powerful race who came at a very early period from that "Officina gentium", Central Asia. The Khasiyas are to this day the most important people numerically in the hills, though the line of division between them and the immigrants from the plains is daily becoming fainter."

(*Note* :—Somatometric measurements and somatoscopic observations were taken on 86 adult male Rajputs of Pauri Garhwal (formerly British Garhwal) in the capacity of one of the members of Anthropology Department, Delhi University, Delhi field survey party in 1956. This material was utilised in preparing the field report by the author, submitted for the degree of Master of Science in lieu of one of the papers.)

* This paper was read at the 49th session of the Indian Science Congress Association held at Cuttack in January, 1962.

It is fairly assumed that in the dark ages Garhwal was ruled by a large number of petty princes. The Katyuras, whose name is still perpetuated in the Katyur Valley in the Almora District, were, according to local traditions, for many years the ruling family of Kumaon. The paramountcy of the Katyuras in upper Garhwal vanished with the death of a foolish and tyrannical monarch, Birdeo.

Garhwal Rajas :

ATKINSON gives four lists of Garhwal Rajas.[1] It was not until the reign of Ajai Pal (1358-1370) that they acquired the hegemony of the country by subduing the indigenous Khasiya Rajas.

The weak state of Kumaon was conquered by Ran Bahadur successor of Sinha Pratap Sah, with the aid of Harak Deb. A Gurkha expedition was set forth in 1790 and occupied Almora. In the meantime the news of Chinese invasion of Nepal reached the besiegers and all Gurkha troops were withdrawn from Kumaon and Garhwal.

In 1803, many Gurkha leaders at the head of a numerous and well-equipped veteran army invaded Garhwal. The Garhwalis on their part made bloody reprisals and a border warfare ensued. In that year Gurkhas occupied Dehra Dun. Pradhaman Sah, the Raja of Garhwal, took refuge in the plains.

FRAZER writes[2] "the Gurkhalis ruled Garhwal with a rod of iron and the country fell into lamentable decay. Its villages became deserted, its agriculture was ruined and its population decreased beyond computation." The Gurkhas reserved their most exquisite savagery for Garhwal, while treating Kumaon with mildness and something approaching justice.

The British invaded Garhwal and obtained footing in Kumaon in the time of Lord Hastings. The Gurkha rule was severe, and when the British conquered Kumaon in 1815, in consequence of an aggression by the Gurkhas, the change was hailed with delight by the hillmen. Eastern Garhwal was taken by the British and was known as *British Garhwal* (now *Pauri Garhwal*).

Method of Selecting the Present Material :

Random selection of a sample is not an easy task and requires very elaborate preliminary arrangements which are impossible in practice in the field. In this situation, rough and ready methods have to be used. The measurements were taken in schools and colleges on adult males. Particular care was taken to eliminate personal bias and no choice was allowed in selecting the subjects for measurements except that

1 *Garhwal Gazetter.*

2 *Ibid.*

crippled persons were excluded, the only limitation being that not more than one person from a single family was measured.

The following non-measureable observations were recorded :

1. Skin colour (cheek/forehead/inner side of arm).
2. Hair colour.
3. Hair quantity.
4. Hair form.
5. Hair whorl.
6. Beard and moustache.
7. Eye colour.
8. Eyeslit.
9. Epicanthic fold.
10. Eyebrows.
11. Supraorbital ridges.
12. Nasion depression.
13. Nasal Septum.

13(a). Nasal Bridge.

14. Forehead.
15. Lips.
16. Eversion of Lips.
17. Chin.
18. Prognathism.
19. Ear lobe.

The skin colour was recorded with the aid of scale of "Von Luschan", the eye colour with the help of "Martin's Augenfarben Tafel" and the hair colour with the aid of "Haarfarben tafel nach Fischer".

Analysis of Somatoscopic Observations:

The practice of dividing a trait into 3 or 4 characters and then observing the character was followed. For example, the trait of hair colour was divided into black, dark brown, medium brown, light brown, grey etc. and then the frequency of each under that particular character was marked.

The colour of the skin was observed on the unexposed part of the body i.e. inner side of the arm. The sleeves of the shirt were pulled up to observe the colour.

The following table shows that yellow brown and brown colours were most frequently observed in Garhwali Rajputs. Dark brown colours were also observed in greater percentage as compared to fair, medium brown and light brown. Brownish black and brunette colour are totally lacking.

Yellow brown colour is predominant showing 38.5% whereas brown colour is observed in 27.9%. There are 19.76% dark brown colour-

TABLE No. 1

SKIN COLOUR (INNER SIDE OF ARM)

Characters	No. observed	Percentage
1. Medium brown	7	8.1
2. Yellow brown	33	38.5
3. Light brown	4	4.65
4. Fair	1	1.2
5. Brown	24	27.9
6. Dark brown	17	19.76
7. Brownish black	—	—
8. Brunette	—	—

ed people. As the main profession of these people is tilling of the lands they are exposed to sun. As it has been established that the skin colour is affected by environments, it is not much reliable in distinguishing races.

Fair coloured people are rarely found but medium brown and light brown people are found showing 8.1% and 4.65% respectively.

TABLE No. 2

SKIN COLOUR (CHEEK/FOREHEAD)

Characters	No. observed	Percentage
1. Brown	51	58%
2. Fair	1	1.16%
3. Light brown	6	6.96%
4. Dark brown	9	10.44%
5. Yellow brown	19	22.09%
6. Brownish black	—	—
7. Brunette	—	—
8. Chocolate	—	—

The colour of the skin was observed on the cheek/forehead of every individual whose morphological measurements were taken. It is clear from the above table that brown colour is predominant as it is present in 58% of the subjects, whereas fair, light brown and dark brown colours were not frequently observed. Yellow brown colour shows also a high percentage of 22.09% as compared to fair, light brown and dark brown.

No trace of brownish black, brunette or chocolate colour was observed. It may be possible that if more subjects are studied these colours to some extent can be met with.

The form of hair affords the most useful and convenient method for the primary classification of human groups. But the character may be deceptive when the hair is permanently waved by artificial means.

TABLE No. 3

HAIR FORM

Characters	No. observed	Percentage
1. Straight	20	23.4%
2. Low Waves	48	54.1%
3. Deep Waves	12	13.95%
4. Curly	6	6.9%
5. Frizzly	—	—
6. Woolly	—	—

The form of hair like straight hair, low waves, deep waves and curly hairs, etc. constitute a variety that is useful for classifying the races. This variety occurs in races of hybridized origin (HOOTON). This variety is quite obvious in these people and so they are of a hybridzed origin. This is also common in the Mediterranean people. Hair form is also modifiable by environments. Naturally curly hair becomes more curly in damp weather, but artificially curved hair straightens out when exposed to moisture. It shows that there is some relation between heat and moisture and curvature of the hair. The curly hair found may be artificial one.

TABLE No. 4

HAIR TEXTURE

Characters	No. observed	Percentage
1. Coarse	17	19.76%
2. Medium	61	69.2%
3. Fine	8	9.3%

In this case the drawback is that there is no proper instrument used for checking the texture, so it may be possible that the different categories of hair texture are confused and depend upon the individual's observation and sense of touch.

TABLE No. 5

HAIR QUANTITY HEAD

Characters	No. observed	Percentage
1. Normal	7	8.1%
2. Medium	66	75.4%
3. Thick	12	13.95%
4. Thin	1	1.2%
5. Baldness	—	—

The hair quantity on the head was observed and it depends upon one's observation to record the quantity of hair. No attempt was made

to count the number of follicles in a given area of skin, as this would have entailed too much of time. No case of baldness was met with.

TABLE No. 6

HAIR COLOUR (HEAD)

Characters	No. observed	Percentage
1. Black	62	70.4%
2. Dark brown	22	25.5%
3. Medium brown	2	2.32%
4. Light brown	—	—
5. Reddish brown	—	—
6. Red	—	—

Hair colour is the result of the amount and quality of pigment in the hair, the extent of the unpigmented spaces in it that reflect the light, and the variations in the quality of the outer hair covering. The common hair pigment is granular brown and black. There are two series of hair colours, brown and red, and one in which the two are mixed. The brown series ranges from black through dark brown, medium brown and light brown to the lightest blond. Black hair is found in 70.4% of cases and this is everywhere much commoner, and the Mongoloids of the far north have just as black hair as those dwelling in the tropics (Hooton). Dark brown colour shows a percentage of 25.5% whereas medium brown gives us a percentage of 2.32%. Hair colour does not seem to be affected by physical environment to any appreciable extent. So hair colour is believed to be reliable for classifying people. It is evident from the above table that black hair colour is more common.

TABLE No. 7

HAIR WHORLS

Types	No. observed	Percentage
TABLE No. a.		
1. Single	81	94.2%
2. Double	5	5.8%
TABLE No. b.		
1. Clockwise	51	59.4%
2. Anti-clockwise	35	40.6%
TABLE No. c.		
1. Single clockwise	49	56.9%
2. Single anti-clockwise	32	37.2%

DOUBLE WHORL

TABLE No. d.

Types	No. observed	Percentage
1. Anti-clockwise and Anti-clockwise	1	1.2%
2. Clockwise and Clockwise	1	1.2%
3. Clockwise and Anti-clockwise	3	3.5%

Within the hair on the head above the junction of the two parieto-occipital sutures a single or more whorls of hair may occur. The hair abruptly changes the usual course and forms a spiral. The direction of this whorl may be either right handed (clock-wise) or left handed (anti-clockwise). Sometimes there may be found two or more whorls. In that case the direction of the whorl becomes clockwise in one and anti-clockwise in another or both clockwise and in rare cases anti-clockwise, as the case may be. The little study which has been done uptil now reveals no sex and age difference in the whorls.

The proportion of appearance of the whorls in both double and single among the Garhwal Rajputs in Table No. (a) show that single whorl appears in larger percentage i.e. 94.2% and lesser percentage in double whorl.

From table (b) it is evident that clockwise whorl is more common whether it is single or double. Anti-clockwise is found in a lesser percentage i.e. 40.6%.

From table (c) it is clear that single clockwise occurs more than single anti-clockwise.

Out of three different types of double whorl (clockwise and clockwise, anti-clockwise and anti-clockwise and clockwise and anti-clockwise), clockwise and anti-clockwise occur in larger number than the other two types i.e. clockwise and anti-clockwise, whereas anti-clockwise and anti-clockwise; clockwise and clockwise give 1.2% each in table (d).

The Garhwali Rajputs are compared with the other hill-tribes of N. W. Himalayas with respect to hair whorls.[3] The data has been taken from Dr. P. C. Biswas's study of the N. W. Himalayan hill-tribes.

The proportion of appearance of the whorl both double and single among the 6 hill-tribes show that single whorl appears in larger percentages and double in lesser proportions among Kanets, Jaunsaries, Tehri Garhwalis and British Garhwalis (Rajputs) whereas among Bhotias and Rajis single whorl is a bit less as compared to the others.

[3] Reprinted from the Eastern Anthropologist Vol. VI, No. 2, December, 1952-February, 1953.

TABLE No. 7(a)

Tribes	Single Whorl Percentage	Double Whorl Percentage
1. Bhotias	80.3	19.7
2. Rajis	84.9	15.1
3. Kanets	94.1	5.9
4. Jaunsaries	97.6	2.4
5. Tehri Garhwalis	92.7	7.3
6. British Garhwal Rajputs	94.2	5.8

TABLE No. 7(b)

Tribes	Single Clockwise Percentage	Single Anti-clockwise Percentage
1. Bhotias	52.1	28.2
2. Rajis	58.5	26.4
3. Kanets	82.4	11.7
4. Jaunsaris	82.9	14.7
5. Tehri Garhwalis	74.5	18.2
6. British Garhwalis (Rajputs)	56.9	37.2

From the above table it is clear that there is difference in the occurrence of the singe clockwise and single anti-clockwise whorls in all the 6 tribes. The single anti-clockwise occurs less than the single clockwise. It appears that the single anti-clockwise occurs in larger number among the Bhotias, Rajis and British Garhwali Rajputs than in Kanets, Jaunsaris and Tehri Garhwalis. The occurrence of single clockwise among the Kanets, Jaunsaris and Tehri Garhwalis is greater than in Rajis, Bhotias and British Garhwal Rajputs.

In the following table 7(c), out of three different types of double whorl, clockwise and anti-clockwise occurs in larger number than the two other types. In the table it appears that Bhotias and Rajis have got clockwise and anti-clockwise more than the Kanets, Jaunsaris, Tehri Garwalis and British Garhwal Rajputs.

TABLE No. 7(c)

Double Whorl	Clockwise and Clockwise Percentage	Anti-clock and Anti-clock Percentage	Clock and Anti-clock Percentage
1. Bhotias	1.4	2.8	15.5
2. Rajis	x	3.8	11.3
3. Kanets	x	x	5.9
4. Jaunsaris	x	x	2.4
5. British Garhwal Rajputs	1.2	1.2	3.5
6. Tehri Garhwalis	x	1.8	5.5

From all the tables for hair whorl it is quite clear which form of whorl appears more in a hill-tribe mentioned therein. In this way the comparison tables help a lot to form a clear idea of the type predominant in one area and not so prominent in another.

TABLE No. 8

HAIR QUANTITY (BEARD AND MOUSTACHE)

Characters	No. observed	Percentage
1. Thin (scanty)	51	59.30%
2. Medium	7	8.1%
3. Pronounced (thick)	8	9.3%
4. Normal	20	23.25%

From the above table it is evident that hair quantity of beard and moustache is scanty with 59.30% whereas normal growing of hair is also common. In this case, sometimes, the hair quantity may be misjudged and in place of normal growth thin growth may be recorded. As the instrument to record hair quantity was not available simple observations were taken. The scanty growth of hair is a characteristic of the Mongoloids.

TABLE No. 9

EYE COLOUR

Characters	No. observed	Percentage
1. Black	7	8.1%
2. Dark brown	32	37.3%
3. Brown	33	38.5%
4. Light brown	14	16.2%
5. Gray brown	—	—
6. Blue brown	—	—

The pigment of the eye is found in the conjunctiva, the sclera, the iris, the choroid and the retina. The retinal pigment consists of a single stratum of black pigment filled cells. Retinal pigment enters into eye colour only when there is any pigment in the iris. Among the Garhwali Rajputs dark brown and brown eyes are common, as they give 37.3% and 38.5% respectively. The light brown colour of eye as shown from the above table is also found in 16.2%, whereas black colour is not common. The prevalent Mongoloid eye colour is dark brown or medium brown (Hooton) and it holds good in this case.

It would appear from the following table that the oblique eyeslits are observed more common than the straight ones, showing 68.6%, while the straight eyeslits show only about half of the percentage of the oblique eyeslits i.e. 31.4%. The medium types of eyeslits are absent.

TABLE No. 10

EYESLITS

Characters	No. observed	Percentage
1. Straight	27	31.4%
2. Medium	—	—
3. Pronounced	—	—
4. Oblique	59	68.6%

TABLE No. 11

EYEFOLD (EPICANTHIC)

Characters	No. observed	Percentage
1. Absent	78	89.7%
2. Medium	3	3.5%
3. Marked	—	—
4. Trace	5	6.2%

The epicanthic fold is obtained when the eye is open and the upper eyelid folds up upon itself, much like the sections of a folding cup (*Beals and Hoijer*). The fold may overhang and, so, conceal the edge of eyelid completely or partially. This is the characteristic feature of the Mongoloids and it is called the Mongolian fold on that account. This easily recognizable characteristic feature of the Mongoloid people is found to be absent in 78 cases giving 89.7%. In 3.5% the epicanthic fold is medium and in 6.2% trace of it is observed. The marked epicanthic fold is totally absent.

TABLE No. 12

EYEBROWS

Characters	No. observed	Percentage
1. Thin	39	45.4%
2. Medium	34	39.7%
3. Thick	13	15.12%

TABLE No. 12a.

Characters	No. observed	Percentage
1. Connected (slight)	18	20.92%
2. Connected (marked)	6	6.96%

From the above table it is clear that the thin eyebrows are commonly observed in Garhwali Rajputs. 45.4% of the sample shows thin eyebrows whereas the medium eyebrows appear in 39.7%. The thick eyebrows are only found in 13 cases out of 86 giving a percentage of 15.12.

In 20.92% the eyebrows are connected slightly whereas in 6.96% they are markedly so.

The following table shows us the different characters of supra-orbital ridges which are divided into four traits i.e. imperceptible, moderate, pronounced, trace. The supra-orbital ridges can be either continuous or separate.

TABLE No. 13

'SUPRA-ORBITAL RIDGES'

Characters	No. observed	Percentage
1. Imperceptible	6	7%
2. Moderate	30	34.8%
3. Pronounced	8	9.3%
4. Trace	42	49.2%

TABLE No. 13a.

1. Continuous	1	1.16%
2. Separate	85	98.84%

In the sample 42 individuals have a trace of supra-orbital ridges showing 49.2%. Only 7% have imperceptible supra-orbital ridges. The moderate supra-orbital ridges are present in quite a good number (34.8%). It is pronounced only in 9.3%. Only 1.16% have continuous supra-orbital ridges whereas in 98.84% it is separate.

TABLE No. 14

NASION DEPRESSION

Characters	No. observed	Percentage
1. Absent	—	—
2. Shallow	38	43.7%
3. Medium	32	37.2%
4. Deep	16	19.1%

The nasion depression is observed by placing a bar along the nasal bridge and the forehead by standing on one side of the subject. Shallow nasion depression is most predominant giving 43.7%, medium nasion depression is seen in 32 cases (37.2%) and in the remaining 19.1% the depression is deep. There is no case in which nasion depression is absent.

The nasal bridge is one of the different parts of the nose, which is racially typical. The nasal bridge is viewed by standing on the side of the subject.

The concave nasal bridge is predominant and straight form of nasal bridge also shows 25.7%, convex and concavo-convex form of nasal bridge show 20.4% and 19.1% respectively. It is clear that all sorts of

TABLE No. 15

NASAL BRIDGE

Characters	No. observed	Percentage
1. Straight	22	25.7%
2. Concave	30	34.8%
3. Convex	18	20.4%
4. Concavo-convex	16	19.1%

nasal bridge are observed in Garhwali Rajputs. The concave form of nasal bridge is present in good numbers. The concave nasal bridge, according to Hooton, is a characteristic feature of the Mongoloid.

The following table indicates the different characters of the nasal septum i.e. downwards, upwards, horizontal.

TABLE No. 16

NASAL SEPTUM

Characters	No. observed	Percentage
1. Downwards	17	19.7%
2. Upwards	18	20.9%
3. Horizontal	51	59.4%

The nasal tip is horizontally inclined in most of the cases i.e. 59.4%, the downwards and upwards positions are less than that of the horizontal one. They represent almost an equal percentage in these people.

TABLE No. 17

FOREHEAD SLOPE

Characters	No. observed	Percentage
1. Straight	10	11.7%
2. Medium	71	80.9%
3. Marked slope	5	6.2%

TABLE No. 17 (a)

FOREHEAD BREADTH

Characters	No. observed	Percentage
1. Medium	33	38.5%
2. Broad	51	57.5%
3. Narrow	2	2.4%

The majority of the Garhwali Rajputs possess medium and broad foreheads. The straight forehead is observed in 11.7% whereas medium forehead is recorded in 80.9%. The marked forehead is shown in 6.2%.

The broad forehead is more commonly observed in 57.5% and medium in 38.5% which is also high. The narrow foreheads are rare being found in only 2.4% of Garhwali Rajputs.

TABLE No. 18

FOREHEAD HEIGHT

Characters	No. observed	Percentage
1. Low	60	69.3%
2. Medium	21	24.3%
3. High	5	6.2%

69.3% of the sample displays low height foreheads whereas 24.3% of individuals fall in the medium height forehead category. The high forehead is rare and is found in only 6.2%. So it is evident that the low height of foreheads is predominant in Garhwali Rajputs.

TABLE No. 19

LIPS

Characters	No. observed	Percentage
1. Thin	5	5.81%
2. Medium	46	41.8%
3. Thick	35	40.9%

TABLE No. 19a.

LIPS EVERSION

Characters	No. observed	Percentage
1. Slight	—	—
2. Medium	—	—
3. Marked	—	—
4. Absent	100	100%

The lip form has also some importance in racial classification. Among the Garhwali Rajputs the medium form of lips shows the highest percentage (51.8%) whereas thick lips are found in 40.9%. Thin lips are observed in only 5.81%. It is possible that sometimes the lips may be thick and recorded as medium wrongly. There is no proper instrument which may help us in distinguishing between different forms of lips and this may lead to some discrepancy in the data presented by different workers.

The eversion of lips is entirely absent. According to Hooton the lips are of little value unless there is a Negroid strain in the race often betrayed by eversion or thickness of membranous lips. The medium type of lips shows a high percentage which indicates the Mongoloid character.

TABLE No. 20

CHIN

Characters	No. observed	Percentage
1. Prominent	51	59.1%
2. Medium	35	40.9%
3. Receding	—	—

TABLE No. 20(a)

SHAPE OF CHIN

Characters	No. observed	Percentage
1. Oval	46	51.8%
2. Square	37	43.1%
3. Pointed	3	3.5%

Tables 20 and 20(a) indicate that majority of the Garhwali Rajputs have prominent chins showing a percentage of 59.1. The medium type is observed in 40.9%, whereas receding chins are totally absent.

The oval shaped chins are most prominent and are observed in 51.8%. The square shaped chins are noticed in 37 cases or 43.1%. The pointed chins are only observed in 3 cases giving 3.5%. It is therefore clear that prominent and oval chins are found in majority of the Garhwali Rajputs.

TABLE No. 21

PROGNATHISM

Characters	No. observed	Percentage
1. Alveolar	13	15.12%
2. Facial	1	1.2%
3. Absent	72	82.8%

TABLE No. 21(a)

Characters	No. observed	Percentage
1. Slight	12	13.95%
2. Medium	2	2.3%
3. Marked	—	—
4. Absent	72	82.8%

Prognathism is defined as the protrusion of the face and jaws and it is observed by looking at the face from one side of the subject. The opposite of this is orthognathous or straight faced person.

From the above tables it is clear that Garhwali Rajputs are orthognathous. The alveolar prognathism which is the bulging of the

alveolar regions of the upper and lower jaws is moderate in this case, which, according to Hooton, is also the characteristic of the Mongoloids and some of the Whites. The facial prognathism is not well-marked, which is the case with the Mongoloids. In 72 cases the prognathism is absent but in 12 cases it is slightly present.

TABLE No. 22

EAR LOBE

Characters	No. observed	Percentage
1. Attached	37	43.1%
2. Separate	46	51.8%
3. Absent	3	3.5%

TABLE No. 22(a)

Characters	No. observed	Percentage
1. Small	31	36%
2. Large	52	58.7%
3. Absent	3	3.5%

The ear lobe is a useless, fatty excrescence of a vestigial organ. This organ is little known in its racial variations. It is seen from the above tables that the lobe is separate in 51.8% and in 43.1% it is found to be attached. In 3% it is altogether absent. The attached ear lobe is a more primitive form than the free lobe.

The lobes which are small show a lower percentage (36%) than the large ones (58.7%). The large lobes are well-developed and are the characteristic of the Mongoloids. The lobe is absent in 3.5%.

ANALYSIS OF SOMATOMETRIC CHARACTERS

The following somatometric measurements were taken on the subjects and the technique of measurement followed is that of R. Martin.

(1) Stature
(2) Sitting Height
(3) Biacromial Diameter
(4) Span
(5) Head Length
(6) Head Breadth
(7) Min. Frontal Diameter
(8) Bizygomatic Breadth
(9) Bigonial Diameter
(10) Nasal Height
(11) Nasal Breadth
(12) Morphological Facial Length
(13) Morphological Upper Facial Length
(14) Auricular Height

(15) Orbito-nasal Curve
(16) Orbito-nasal Breadth
(17) Profile Angle

The following indices have been worked out from the above measurements:

(1) Cephalic Index
(2) Length-height Index
(3) Breadth-height Index
(4) Tr. Fronto-parietal Index
(5) Morphological Facial Index
(6) Morphological Upper Facial Index
(7) Nasal Index
(8) Tr. Cephalo-facial Index
(9) Gonio-zygomatic Index
(10) Fronto-zygomatic Index
(11) Orbito-nasal Index

TABLE No. I

"Statistical constants of the measurements and indices with their respective standard errors".

Measurements	*No.*	*Mean with S. E.* [1]	*S. D. with S. E.* [2]	*C. V. with S. E.* [3]	*Max.*	*Min.*	*Range*
1. Stature (cms)	86	163·8±0·61	5·74±0·43	3·50±0·26	174·1	146·2	27·9
2. Biacromial diameter	„	367·8±2·28	21·15±1·61	5·75±0·43	422	324	98
3. Sitting height	85	850·7±3·66	33·74±2·57	3·96±0·30	932	770	162
4. Head length	86	191·1±0·71	6·62±0·50	3·46±0·26	205	174	31
5. Head breadth	„	141·3±0·66	6·23±0·47	4·41±0·33	157	123	34
6. Auricular height	„	127·0±1·01	10·93±0·83	8·56±0·64	151	89	62
7. Min. frontal breadth	„	105·0±0·54	5·08±0·38	4·84±0·36	120	95	25
8. Bizygomatic breadth	„	134·5±0·55	5·16±0·39	3·83±0·29	145	121	24
9. Bigonial breadth	„	103·0±0·66	6·19±0·47	6·19±0·45	115	87	28
10. Nasal height	„	50·0±0·42	3·90±0·29	7·80±0·59	57	41	16
11. Nasal breadth	„	36·0±0·30	2·81±0·21	7·70±0·59	47	29	18
12. Morphological facial height	„	113·0±0·65	6.07±0·46	5·37±0·41	127	100	27
13. Morphological upper facial height	„	68·0±0·53	4·99±0·38	7·33±0·55	84	57	27
14. External orbital breadth	„	90·7±0·46	4·33±0·33	4·78±0·36	102	81	21
15. Orbito–nasal arch	„	103·7±0·77	7·19±0·54	6·93±0·52	122	91	31
16. Span	„	167·83±·71	6·67±0·50	3·38±0·25	181·5	149·1	32·4
17. Profile angle	„	86° ± 0·40	3·80±0·29	4·42±0·34	96°	70°	26°

1. S. E. — Standard Error. 2. S. D. — Standard Deviation.
3. C. V. — Coefficient of Variation.

INDICES

The following table shows the mean, standard deviation, coefficient of variation and their respective standard error with range of variation for the different indices calculated from various somatometric measurements of Garhwal male Rajputs.

TABLE No. II

Characters	*No.*	*Mean with S. E.*[1]	*S. D. with S. E.*[2]	*C. V. with S. E.*[3]	*Max.*	*Min.*	*Range*
1. Cephalic index	86	74·0±10·35	3·29±0·25	4·45±0·33	83·80	66·58	17·22
2. Length-height index	,,	66·23±0·61	5·72±0·43	8·64±0·65	77·84	47·85	29·99
3. Breadth-height index	,,	92·94±0·92	8·56±0·65	9·22±0·70	111·03	62·68	48·35
4. Total face index	,,	84·00±0·55	5·10±0·38	6·07±0·46	94·21	72·46	21·75
5. Nasal index	,,	73·10±0·73	6·77±0·51	9·26±0·70	102·17	59·26	42·91
6. Orbito-nasal index	,,	114·50±0·56	5·22±0·39	4·55±0·34	129·60	101·08	28·52
7. Morphological upper facial index	,,	50·30±0·44	4·11±0·31	8·18±0·62	63·64	41·38	22·26
8. Gonio-zygomatic index	,,	76.25±0.41	3·83±0·29	5·02±0·38	85.95	63·97	21.98
9. Fronto-zygomatic index	,,	78·10±0·35	3.31±0·25	4·24±0·32	88·89	70·80	18·09
10. Transverse cephalo-facial index	,,	95·00±0·38	3·54±0·27	3·78±0·28	104·13	85.21	18·92
11. Transverse fronto-parietal index	,,	74.31±0·38	3·54±0·27	4·77±0·36	84·30	66·44	17·86

1. Standard Error. 2. Standard Deviation. 3. Coefficient of Variation.

TABLE No. III

STATURE

Types	No. observed	Percentage
1. Pygmy 0 – 129.9	—	—
2. Very short (130.0 – 149.9)	2	3.32%
3. Short (150.0 – 159.9)	19	22.09%
4. Below medium (160.0 – 163.9)	24	27.90%
5. Medium (164.0 – 166.9)	14	16.27%
6. Above medium (167.0 – 169.9)	12	13.95%
7. Tall (170.0 – 179.9)	15	17.44%
8. Very tall (180.0 – 199.9)	—	—
9. Giant (200.00 – x)	—	—

A comparison of human beings in respect of stature discloses, not merely marked individual differences, but also a considerable variation in the mean stature of different groups.

The above table shows the percentage of different types of stature of Rajput males of Garhwal. The classification followed is according to Martin.

The average stature of a Rajput male is 163.86 cms, the maximum being 174.10 cms., minimum 146.20 cms., and the range of variation 27.90 cms. The highest percentage of the Rajputs is of medium stature i.e. 58.12%. The short stature represented in this table shows only 24.41% compared to tall being 17.44%. It clearly shows that in the 86 adult Rajput males measured medium stature is more common. It is 3 times more than the tall stature.

According to Dr. B. K. CHATTERJI the presence of a high range of variation in stature indicates that admixture had taken place among them.

TABLE No. IV

CEPHALIC INDEX

Types	No. observed	Percentage
1. Dolichocephalic (0 – 75.9)	66	76.77%
2. Mesocephalic (76.0 – 80.9)	17	19.75%
3. Brachycephalic (81.0 – 85.4)	3	3.48%
4. Hyperbrachycephalic (85.5 – x)	—	—

The above table shows the percentage of the different types of head among the Garhwali Rajputs.

The mean cephalic index among males is 74.01 and it ranges from 83.80 to 66.58, the range being 17.22.

The dolicho-cephalic element is about four times more common than the mesocephalic. It is also evident that dolichocephalic element is predominant (76.77%), mesocephalic element also being observed in 19.75%. Brachycephalic element is poorly represented (3.48%). Hyperbrachycephalic is totally lacking.

TABLE No. V

BREADTH-HEIGHT INDEX

Types	No. observed	Percentage
1. Tapeinocephalic (0 – 78.9)	6	6.9%
2. Matrio-cephalic (79.0 – 84.9)	10	11.6%
3. Acrocephalic (85.0 – x)	70	81.4%

The above table gives the classification of the breadth-height index calculated by the formula

$$\frac{\text{Head height}}{\text{Head breadth} \times 100}$$

The mean breadth-height index in this case is 92.94. It varies from 111.03 maximum to 62.68 minimum with a range of variation of 48.35 which is high.

They exhibit a greater acrocephalic element i.e. 81.4% and the matriocephalic and the tapeinocephalic are present in smaller number, i.e. 11.6% and 6.9% respectively.

TABLE No. VI

TOTAL FACE INDEX

Types	No. observed	Percentage
1. Hypereury (0 – 78.9)	11	12.8%
2. Euryprosopic (79.0 – 83.9)	32	37.3%
3. Mesoprosopic (84.0 – 87.9)	22	25.7%
4. Leptoprosopic (88.0 – 92.9)	17	20.3%
5. Hyperleptoprosopic (93.0 – x)	4	4.65%

The above table shows the percentages of different types of total facial index.

The average morphological total facial index is 84.00, the maximum being 94.21 and the minimum being 72.46% and so the range of variation is 21.75.

They show higher concentration of the euryprosopic being 37.3% while mesoprosopic type is relatively common. Leptoprosopic element is found in 20.3% of the cases. It is evident that all the elements are found in more or less percentage.

TABLE No. VII

NASAL INDEX

Types	No. observed	Percentage
1. Hyperleptorrhine (0 – 54.9)	—	—
2. Leptorrhine (55.0 – 69.9)	31	36%
3. Mesorrhine (70.0 – 84.9)	49	57%
4. Platyrrhine (85.0 – x)	6	6.96%

The above table shows the percentage of the different types of noses.

The average nasal index is 73.10, the maximum being 102.17 and the minimum being 59.26. The range of variation is 42.91. The range of variation is high in this case as there are 6 cases of platyrrhine type giving 6.96%. Naturally, it has affected the range. In case of male

Rajis of Almora, the leptorrhine element is more common but in this case mesorrhine element shows 57% whereas leptorrhine element is found in 36% of the cases. The mesorrhine type of nose is more common among the Brahmins of Kumaon. In this case also it is common. Rajputs of Kumaon also exhibit 5.77% of platyrrhine type as worked out by S. C. TIWARI (data unpublished). The hyperleptorrhine element is altogether lacking in the case of Garhwali Rajputs.

According to Dr. B. K. CHATTERJEE the presence of high variation indicates the admixture had taken place among the people.

TABLE No. VIII

ORBITO-NASAL INDEX

Types	No. observed	Percentage
1. Platyopic (0 – 109.9)	15	17.3%
2. Mesopic (110.0 – 112.9)	23	26.9%
3. Prosopic (113.0 – x)	48	55.8%

This is intimately connected with the formation of cheek bones, the margin of the bones, sockets of the eyes and the root of the nose. It is impossible to take precise measurement on the cheek bones of the living subjects. This index gives information about the relative projection of the root of the nose above the level of the eye-sockets.

The above table shows the percentages of the platyopic, mesopic and prosopic types of the orbito-nasal index.

The average orbito-nasal index in this case is 114.50 the maximum being 129.60 and the minimum being 101.08. The range of variation comes to 28.52.

The prosopic element is predominant and gives the highest percentage i.e. 55.8%. Platyopic is less than mesopic, the percentages being 17.3% and 26.9% respectively. It is quite clear that 55.8% of Rajputs have high noses.

TABLE No. IX

MORPHOLOGICAL UPPER FACIAL INDEX

Types	No. observed	Percentage
1. Hypereuryene (0 – 42.9)	3	3.5%
2. Euryene (43.0 – 47.9)	21	24.5%
3. Mesene (48.0 – 52.9)	41	47.7%
4. Leptene (53.0 – 56.9)	15	17.3%
5. Hyperleptene (57.0 – x)	6	6.9%

The upper table shows the percentage of different types of morphological upper facial index.

It is evident that mesene element has a higher concentration giving 47.7% whereas euryene is only 24.5%. Leptene element is also found in these people but it shows a smaller percentage. The Rajputs of Kumaon, as worked out by S. C. TIWARI, show the highest percentage of mesene i.e. 63.46%.

TABLE No. X

TRANSVERSE CEPHALO-FACIAL INDEX

Types	No. observed	Percentage
1. Small (0 – 77.9)	—	—
2. Under medium (78.0 – 87.9)	1	1.2%
3. Over medium (88.0 – 97.9)	70	81.5%
4. Big (98.0 – x)	15	17.3%

The mean transverse cephalo-facial index is 95.00 with 104.13 as maximum and 85.21 as minimum, the range of variation being 18.92.

The over medium element is predominant in this case being 81.5% whereas the big element shows only 17.3%. The small element is totally lacking.

TABLE No. XI

LENGTH-HEIGHT INDEX

Types	No. observed	Percentage
1. Chamacephalic (0 – 57.6)	7	8.1%
2. Orthocephalic (57.7 – 62.5)	10	11.6%
3. Hypsicephalic (62.6 – x)	69	80.2%

In the above table classification of length-height index is given.

In this case the frequency distribution of the length-height index of the Rajput males shows that the mean value stands at 66.23, the maximum being 77.84 and minimum 47.85, the range being 29.99. The high range shows that admixture had taken place in these people.

The hypsicephalic element is predominant among these people. The orthocephalic and the chamacephalic elements are almost equally represented being 11.6% and 8.1% respectively. The hypsicephalic element surpasses the other two elements as it is 80.2% among these people.

The following table shows the transverse fronto-parietal index.

The mean fronto-parietal index has been calculated to be 74.31, 84.30 being the maximum and 66.44 being the minimum, so that the range of variation comes to 17.86. In this case mesometopic element shows higher concentration and gives 46.5% whereas hypermesometopic is a bit less i.e. 36%. It is thus evident that mesometopic is predominant among the Garhwali Rajputs.

TABLE No. XII

TRANSVERSE FRONTO-PARIETAL INDEX

Types	No. observed	Percentage
1. Ultrastenometopic (0 – 54.9)	—	—
2. Hyperstenometopic (55.0 – 59.9)	—	—
3. Stenometopic (60.0 – 64.9)	—	—
4. Hypo-mesometopic (65.0 – 69.9)	11	12.8%
5. Mesometopic (70.0 – 74.9)	40	46.5%
6. Hypermesometopie (75.0 – 79.9)	31	36%
7. Eurymetopic (80.0 – 84.9)	4	4.65%
8. Hypereurymetopic (85.0 – x)	—	—

TABLE No. XIII

GONIO - ZVGOMATIC INDEX

Types	No. observed	Percentage
1. Very narrow (0 – 69.9)	4	4.65%
2. Narrow (70.0 – 74.9)	24	28%
3. Medium (75.0 – 79.9)	45	52.32%
4. Broad (80.0 – 84.9)	12	13.95%
5. Very broad (85.0 – x)	1	1.2%

The frequency distribution of the gonio-zygomatic index shows the mean 76.25, 85.95 being the highest and 63.97 the lowest, the range of variation being 21.98. The medium type is predominant and the narrow type is half of the medium. This implies that the face below the zygomatic arches is neither broad nor narrow but of medium size. 1.2% of very broad element is also found. It is evident that medium element is more common.

TABLE No. XIV

FRONTO-ZYGOMATIC INDEX

Types	No. observed	Percentage
1. Small (0 – 77.9)	45	52.32%
2. Under medium (78.0 – 87.9)	40	46.5%
3. Over medium (88.0 – 97.9)	1	1.2%
4. Big (98.0 – x)	—	—

The average fronto-zygomatic index comes to be 78.10 having the maximum of 88.89 and the minimum of 70.80, the range being 18.09. The smalll and the under medium elements exhibit 52.32% and 46.5% respectively, showing that these people have not broad frontal region.

This implies that the zygomatic arches project more from the frontal region in the case of 52.32% and in the case of 46.5% they project less from the frontal region.

It appears from the above analysis of the different characters that the Garhwali Rajputs are not a homogeneous group and that some heterogeneity does exist in their morphological characters. This is further verified from the table prepared by P. C. MAHALANOBIS to test the homogeneity and heterogeneity of the group of people by their coefficient of variation (C.V.) which has been calculated as follows :

$$\frac{\text{S.D.} \times 100}{\text{Mean of the measurement}}$$

where S.D. = standard deviation.

The coefficient of variation is above 4 for 25 characters which clearly show that they are highly mixed. Out of 32 characters 6 characters are mixed while one is partly mixed. There is not even a single case of homogeneity.

The following table gives the frequency according to P. C. MAHALANOBIS.

TABLE No. XV

Coefficient of Variation	Observed characters
1. Homogeneous (2.0 – 3.0)	x
2. Partly mixed (3.0 – 3.5)	1
3. Mixed (3.5 – 4.0)	6
4. Highly mixed (4.0 – x)	25

Here the Rajput males show 25 heterogeneous characters out of a total of 32. The whole population is heterogeneous as can but be expected from a group living in the proximity of a great trade route.

It is quite obvious from the above table that the Garhwali Rajputs are highly mixed group and heterogeneity is thus an established fact.

The table given below shows the correlation of stature, cephalic index and nasal index of Garhwali Rajputs :—

From this table it appears that the most common feature among Garhwali Rajputs is medium stature, dolichocephalic head, mesorrhine nose (29.07%) and medium stature, dolichocephalic head and leptorrhine nose (15.1%).

It is also evident that the Rajputs do not exhibit a homogeneous distribution of somatic characters, as medium stature is associated with dolichocephalic heads and lepto and mesorrhine noses.

CORRELATION OF STATURE CEPHALIC INDEX AND NASAL INDEX

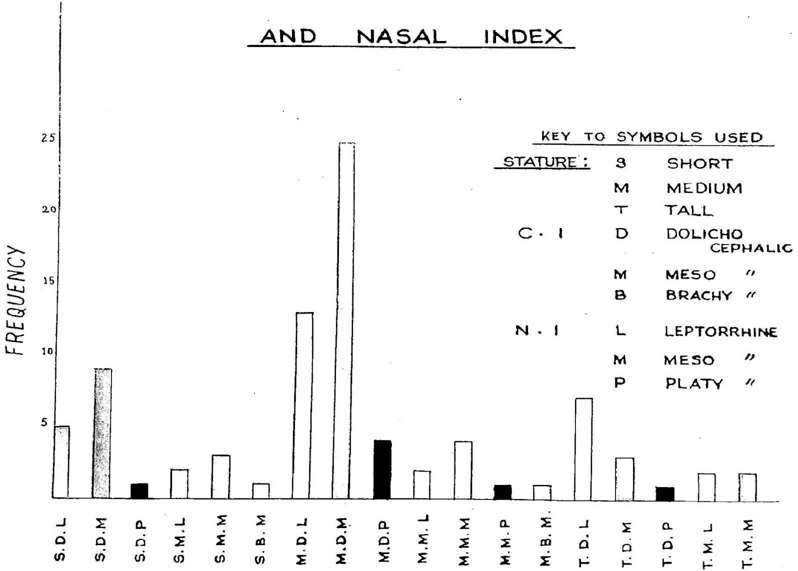


TABLE No. XVI

Stature	Cephalic Index	Nasal Index	Observed Number	Percentage
Short (0.159.9)	Dolichocephalic (0–75.9)	Leptorrhine (55.0–69.9)	5	5.8%
,,	,,	Mesorrhine (70.0–84.9)	9	10.4%
,,	,,	Platyrrhine (85.0–99.9)	1	1.2%
,, ,,	Mesocephalic (76.0–80.9)	Leptorrhine	2	2.3%
,,	,,	Mesorrhine	3	3.5%
,,	,,	Platyrrhine	—	—
,,	Brachycephalic (81.0–85.4)	Leptorrhine	—	—
,,	,,	Mesorrhine	1	1.2%
,,	,,	Platyrrhine	—	—
Medium (160–169.9)	Dolichocephalic	Leptorrhine	13	15.1%
,,	,,	Mesorrhine	25	29.07%
,,	,,	Platyrrhine	4	4.6%
,,	Mesocephalic	Leptorrhine	2	2.3%
,,	,,	Mesorrhine	4	4.6%
,,	,,	Platyrrhine	1	1.2%
,,	Brachycephalic	Leptorrhine	—	—
,,	,,	Mesorrhine	1	1.2%
,,	,,	Platyrrhine	—	—
Tall (170.0–x)	Dolichocephalic	Leptorrhine	7	8.1%
,,	,,	Mesorrhine	3	3.5%
,,	,,	Platyrrhine	1	1.2%
,,	Mesocephalic	Leptorrhine	2	2.3%
,,	,,	Mesorrhine	2	2.3%
,,	,,	Platyrrhine	—	—
,,	Brachycephalic	Leptorrhine	—	—
,,	,,	Mesorrhine	—	—
,,	,,	Platyrrhine	—	—

However, the predominant element among them is medium stature and dolichocephalic head in association with lepto to mesorrhine type of nose.

TABLE No. XVII

Caste/Tribe Locality No. of subjects Author	Brahmins Almora 80 Tiwari	Khasiyas Almora 100 Tiwari	Doms Almora 100 Tiwari	Bhotiyas Almora 100 Tiwari	Rajis Almora 70 Tiwari	Shokas Almora 64 Mehra	Rajputs P. Garhwal 86 D.U. Exp. 1956	Brahmins Garhwal 86 D.U. Exp. 1956	Kanets Lahoul 30 Holland	Kanets Kulu 60 Holland
1. Stature (cms)	166.95	163.84	158.80	160.18	149.42	157.85	163.86	164.66	161.8	165.4
2. H. Length	194.27	190.77	190.22	185.47	181.53	185.78	191.10	191.9	189.0	192.0
3. H. Breadth	146.16	145.05	141.65	148.01	134.26	146.48	141.30	139.2	147.0	143.0
4. Agricular Ht.	122.31	123.65	116.77	130.01	125.20	142.42	127.00	122.5	—	—
5. Min. Frontal Breadth	106.98	102.63	102.40	102.24	99.56	105.85	105.00	102.1	—	—
6. Bizygomatic Br.	132.69	134.90	132.97	138.39	128.11	139.45	134.50	133.3	—	—
7. Bigonial Br.	104.43	101.65	99.25	97.53	96.06	103.82	103.00	101.0	—	—
8. Mor. Facial Ht.	111.04	116.48	111.77	118.48	116.20	116.40	118.00	112.29	—	—
9. Mor. Up. Fac. Ht.	63.57	66.50	64.27	69.25	68.58	68.20	68.00	66.87	—	—
10. Nasal Ht.	50.19	51.29	49.00	54.42	53.90	51.17	50.00	49.26	53.00	51.0
11. Nasal Br.	35.04	36.52	36.65	38.06	37.35	36.84	36.00	35.2	35.00	37.0
12. Ext. Orbt. Br.	105.13	95.98	96.60	102.66	101.40	104.14	90.70	78.08	—	—
13. Orb.-nas. Curve	123.51	112.28	113.07	—	114.67	118.75	103.70	106.2	—	—
14. C. I.	75.25	76.12	74.51	99.89	73.99	78.84	74.01	72.23	77.5	74.3
15. N. I.	70.07	71.56	74.93	70.20	69.35	72.57	73.10	69.65	66.4	74.1
16. Orbito-nasal Index	117.46	117.08	117.09	—	110.45	114.85	114.50	115.20	112.9	—

TABLE No. XVII—(*Contd.*)

Caste/Tribe	Chamar	Other artisans	Koltas & others	Khasa Brahmans	Khasa Rajputs	Doms	Bhatu	Tharus	Mushohars
Locality	U.P	U.P.	Jaunsar	Jaunsar	Jaunsar	Hills	U.P.	Nainital	U.P.
No. of subjects	159	173	100	100	100	113	150	191	18
Name of author	Majumdar	Majumdar	Majumdar	Majumdar	Majumdar	Majumdar	Majumdar	Majumdar	Risley
1. Stature (cms)	161.88	161.34	161.1	163.3	162.4	166.53	163.38	163.33	159.8
2. H. Length	186.85	187.69	191.6	192.9	193.7	186.40	186.10	187.78	181.7
3. H. Breadth	136.40	136.84	139.9	137.6	138.7	137.52	138.58	135.90	134.8
4. Auricular Ht.	—	—	—	—	—	—	—	—	—
5. Min. Frontal Breadth	102.62	102.44	—	—	—	104.16	99.34	100.00	—
6. Bizygomatic Breadth	130.28	131.30	130.6	131.2	132.2	132.64	133.55	131.68	—
7. Bigonial Breadth	97.43	99.20	98.3	99.7	99.6	99.95	100.49	100.01	—
8. Mor. Facial Height	113.00	115.24	113.2	117.7	118.1	120.18	117.48	113.60	—
9. Mor. Upper Facial Height	62.64	63.40	62.0	64.2	64.4	66.20	65.94	63.90	—
10. Nasal Height	48.50	48.72	51.10	53.4	53.0	50.34	52.06	42.94	42.5
11. Nasal Breadth	36.35	36.27	38.0	35.4	35.7	38.11	35.65	37.90	36.6
12. Ext. Orbital Breadth	—	—	101.5	101.0	102.5	—	—	—	—
13. Orbito-nasal Curve	—	—	114.4	116.3	116.8	—	—	—	—
14. C. I.	79.92	72.98	—	—	—	73.69	—	72.33	74.1
15. N. I.	75.41	74.48	—	—	—	75.98	—	76.22	86.1
16. Orbito-nasal Index	—	—	—	—	—	—	—	—	—

TABLLE No. XVII—(*Contd.*)

	Caste/Tribe Locality No. of Subjects Name of Author	Newar Nepal 13 Risley	Limbu Nepal 50 Risley	Gurung Darjeeling and Nepal 28 Risley	Tibetans E. Nepal 108 Risley	Lepchas Sikim 57 Risley	Chakma Assam 100 Risely
1.	Stature (cms)	161.4	160.3	169.8	163.3	157.0	159.5
2.	Head Length	181.9	181.4	181.3	186.9	185.0	177.9
3.	Head Breadth	148.3	153.1	148.1	151.4	146.7	150.0
4.	Auricular Height	—	—	—	—	—	—
5.	Min. Frontal Breadth	—	—	—	—	—	—
6.	Bizygomatic Breadth	—	—	—	—	—	—
7.	Bigonial Breadth	—	—	—	—	—	—
8.	Morph. Facial Height	—	—	—	—	—	—
9.	Morph. Upper Facial Ht.	—	—	—	—	—	—
10.	Nasal Height	50.7	50.2	48.9	51.8	51.6	47.2
11.	Nasal Breadth	37.2	37.2	38.4	38.3	34.7	39.9
12.	Ext. Orb. Breadth	108.6	109.1	—	....	106.4	—
13.	Orbito-nasal Curve	119.7	116.7	—	—	115.1	—
14.	C. I.	81.5	84.3	81.6	81.0	79.9	84.3
15.	N. I.	73.3	74.1	78.5	73.9	67.2	84.5
16.	Orbito-nasal Index	110.2	106.9	109.9	109.1	108.1	106.4

In the above table are shown the averages of different morphological measurements of different castes and tribes, especially of the Himalayas, in order to indicate their relationship with the Garhwali Rajputs. The authors of this work are also referred to. The data collected by Dr. Tiwari is still unpublished but has been given here for the sake of comparison.

TABLE XVIII

'TABLE STANDING THE INTERPRETATION OF "t-test" IN A SUMMATIONAL FORM OF TWENTY-FIVE CHARACTERS.

GARHWALI RAJPUTS WITH :

	Caste/Tribe	Locality	Author	No. of characters	Interpretation of "t-test" Significant (more than 2.25)	Doubtful (1.75–2.25)	Non-significant (Less than 1.75)
1.	Khasa Rajputs	Jaunsar	Majumdar	12	9	1	2
2.	Brahmins	Almora	Tiwari	24	19	2	3
3.	Khasa Rajputs	Almora	Tiwari	24	13	3	8
4.	Koltas and "Others" (?)	Jaunsar	Majumdar	12	7	2	3
5.	Khasa Brahmins	Jaunsar	Majumdar	12	8	2	2
6.	Doms	Almora	Tiwari	24	12	4	8
7.	Bhotiyas	Almora	Tiwari	23	2	2	1
8.	Rajis	Almora	Tiwari	25	17	1	7
9.	Brahmins	U.P.	Guha	20	16	—	4
10.	Shokas	Almora	Mehra	25	17	—	8
11.	Brahmins	Garhwal	D. U. Expd. 1956	22	11	3	8

The predominant significant differences of Garhwali Rajputs exist with the Brahmins of Almora, Khasa Rajputs of Jaunsar, Bhotiyas of Almora and Brahmins of U.P.

Similarly the predominant non-significant differences exist with the Khasa Rajputs of Almora, Doms of Almora, Rajis of Almora and Shokas of Almora, but these very people show notable non-significant difference also, though in totally different characters.

This analysis gives us a broad outline of statistically significant and non-significant differences of Garhwali Rajputs with respect to various anthropometric characters as measured by different workers like Majumdar, Tiwari (data unpublished) and others. It would indicate that Garhwali Rajputs are akin to Khasa Rajputs of Almora with respect to Nasal Index and Stature; to Doms of Almora in C.I. and N.I., and to Rajis of Almora in C.I. The predominantly Mongoloid Bhotiyas and the predominantly. Mediterranean Brahmins of U.P. bear significant differences with respect to these three important characters i.e. C.I., N.I. and Stature.

Thus we see that Garhwali Rajputs bear the closest possible similarity with Doms, Khasa Rajputs of Almora and Rajis of Almora.

From the point of view of Guha and Hutton on the ethnic history of India[4] and GUHA's classification of Indian people (i) Khasa Rajputs of Almora are, ethnically speaking, predominantly Mediterranean, partly mixed with Mongoloids and the aboriginal Proto-Australoids, though slightly.

(ii) Similarly Doms of Almora are predominantly Proto-Australoids but mainly mixed with Mongoloids and slightly with Mediterranean.

(iii) Rajis of Almora are predominantly Mongoloids[5] but mixed in certain degree with Mediterranean Indians and perhaps slightly with aboriginal Proto-Australoids.

It must be noted that the writer is basing his opinion on the aboriginal population being of Doms (and therefore Proto-Australoids) as held by Dr. D. N. MAJUMDAR (*Fortunes of Primitive Tribes*). Therefore, the ethnic elements among Garhwali Rajputs could be enumerated as folows —

(i) Mediterranean.
(ii) Mongoloid.
(iii) Proto-Australoid.

Conclusion :

It is common knowledge in 'Physical Anthropology' that no character can singly be the criterion for determining racial affinities. And even a small group of characters does not seem to help much, but as the author has taken only anthropometry, he would like to confine himself to it while drawing the conclusion.

It must be observed that he is fully conscious of the meagreness of his data drawn from 86 subjects as has also been pointed out by Dr. Guha (Census 1931, Vol. I, Part III, p. xviii). Bhattacharjee in a paper (*Anthropologist*, Vol. II, No. 2, p. 34) on Dermatoglyphics has commented "though comparisons of data from different populations aim at tracing the biological relationship, it is difficult to draw a definite conclusion depending on the resemblance of one criterion only". Rife (1953) already reported that 'marked similarity in many independent criteria is necessary to find the relationship between the different peoples'.

So to say the help should be drawn from all the available methods in Physical Anthropology to establish any relationship, e.g. Blood groups and Dermatoglyphics which do not fall within the orbit of the author's study.

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4 (i) *Census of India* 1931 — HUTTON.
(ii) *Racial Classification of India* — GUHA (O.U.P.).
(iii) *Ethnology of India* — GUHA (Field Sciences of India).

5 TIWARI, *op. cit.*

TABLE No. XIX

Comparison of three anthropometric characters i.e. Stature, Cephalic Index and Nasal Index for the different castes/tribes of Northern India, Nepal and Eastern Himalayas.

Peoples	Locality	Total No.	Average Stature	Average C.I.	Average N.I.	Measured by
1	2	3	4	5	6	7
Limbu	Nepal	50	160.3	84.3	74.1	Risley
Chuhra	Punjab	60	166.6	73.4	75.2	"
Kambu	"	32	157.1	81.0	76.6	"
Kiranti	"	11	158.6	82.3	85.7	"
Newar	"	13	161.4	81.5	73.3	"
Gurungs	W. Nepal	27	162.3	79.6	75.3	Eickstedt
Gurkhas	Nepal	69	161.7	82.7	73.4	"
Tibetans	E. Himalayas	108	163.3	81.0	73.9	Risley
Khas Brahmins	Jaunsar	100	163.3	71.3	66.0	Majumdar
Khas Rajputs	"	100	162.4	71.6	67.3	"
Artisans	"	100	161.1	72.0	74.5	"
Kanets	Lahauli	30	161.8	77.5	66.4	Holland
Kanets	Kulu	60	165.4	74.3	74.1	"
Tharu	Nainital	191	163.33	72.33	76.22	Majumdar
Brahmins	Almora	80	166.95	75.25	70.07	Tiwari
Khasa Rajputs	"	100	163.84	76.12	71.56	"
Doms	"	100	158.80	76.51	74.93	"
Bhotiyas	"	100	160.18	79.89	70.20	"
Rajis	"	70	159.42	73.99	69.35	"
Khasis	Assam	81	156.9	77.30	77.40	Guha
Murmi	Nepal &	65	166.9	79.5	75.2	Risley
Gurungs	Darjeeling	28	169.8	81.6	78.5	"
Lepcha	Sikkim	57	157.0	79.9	67.2	"
Mushohar	U.P.	18	159.80	74.1	86.1	"
U. P. Brahmins	"	50	165.48	72.48	69.56	Guha
Misc. Rajputs	"	50	168.44	74.98	70.03	"

TABLE No. XIX—(*Contd.*)

1	2	3	4	5	6	7
Kharwar	U.P.	197	160.79	73.60	79.97	Majumdar
Korwa	,,	101	158.17	71.90	85.54	,,
Other Artisans	,,	173	161.34	72.98	74.48	,,
Bhatu	,,	150	163.38	74.46	68.86	,,
Dom (Hill)	Gorakhpur	113	166.53	73.69	75.98	,,
Baghel Rajputs	U.P.	50	169.19	76.28	70.42	Guha
Nagar Brahmins	Gujrat	105	164.86	81.38	69.05	,,
Audich	,,	93	164.78	78.77	69.20	,,
Koltas	U.P.	100	161.1	73.0	74.5	Majumdar
Doms	,,	113	166.53	73.79	75.70	,,
Khatri	Punjab	60	166.20	74.0	66.1	Risley
Gujar	,,	13	170.3	70.4	66.9	,,
Rajputs	Rajasthan	120	174.8	72.4	71.6	,,
Brahmins	Manali	5	166.9	72.99	70.99	Delhi University ex-
Rajputs	,,	52	162.9	72.83	66.62	pedition 1954.
J. Castes	,,	40	162.6	73.55	66.56	
Rajputs	Garhwal	86	163.86	74.01	73.10	Delhi University ex-
Brahmins	,,	86	164.62	72.23	69.65	pedition 1956.
Shokas	Almora	64	157.85	78.84	72.57	Mehra
Gwala	Bihar	100	164.2	76.2	76.7	Risley
Chhatri	U.P.	100	166.1	73.0	77.7	,,
Gwala	U.P.	100	162.8	73.0	80.9	,,
Kol	,,	32	165.0	72.4	82.2	,,
Baniyas	,,	80	164.2	71.3	79.6	,,
Brahmins	Bihar	67	166.1	74.9	73.2	,,
Lohar	U.P.	45	163.6	72.8	82.4	,,
Kanjar	,,	103	163.6	74.7	78.0	,,
Kahar	Bihar	56	162.4	76.1	79.7	,,

In the above table the averages of the Stature, Cephalic Index and Nasal Index of the different Castes and tribes of India and their relation with the people i.e. the Rajputs (Males) of British Garhwal measured in this report are given.

Fully knowing all this the author has tried to present a picture of Garhwali Rajputs' relations with other groups studied so far on the basis of Stature, C.I., and N.I. duly supported by his findings of their (Garhwali Rajputs) anthroposcopic characters.

Taking into consideration the stature factor, the Garhwali Rajputs are akin to Bihar Gwala, U.P. Baniya, Garhwal Brahmins, Gujrat Audich, Nagar Brahmins of Gujrat, U. P. Kols, Kulu Kanets, U. P. Brahmins, U. P. Chatri, Bihar Brahmins, Punjab Khatris, U. P. and Gorakhpur (Hills) Doms, Chuhra (Punjab), Murmi (Nepal and Darjeeling), Manali Brahmins, Almora Brahmins, U. P. Misc. Rajputs, Gurungs and Baghel Rajputs of U. P., on the one hand, and Almora Rajputs, U. P. Lohar and Kanjar, Bhatus, Tharus of Nainital, Jaunsar Brahmins, Tibetans, Manali Rajputs, U.P. Gwala, Manali Lower Caste people, Jaunsar Rajputs, Bihar Kahar, Gurungs, Lahauli Kanets, Gurkhas, Newar, U.P. Artisans, Jaunsar artisans, U. P. Koltas, U. P. Kharwar, Limbu and Almora Bhotiyas, on the other.

Taking into consideration the C.I. factor, the Garhwali Rajputs are akin to U. P. Mushohar, KULU Kanets, Bhatus, Doms of Almora, U. P. Kanjar, Bihar Brahmins and U. P. Misc. Rajputs, on the one hand, and Khatri (Punjab), Rajis of Almora, Doms of U. P., Gorakhpur (Hill) Doms, U. P. Kharwar, Manali Lower Caste people, Chuhra (Punjab), U.P. Gwala, U. P. Chhatri, U. P. Koltas, Jaunsar Artisans, Manali Brahmins. U. P. Artisans, Manali Rajputs, U. P. Lohars, U. P. Brahmins, U. P. Kols, Gujar of Punjab, Rajputs of Rajasthan, Tharus of Nainital, Garhwal Brahmins, Korwa, Jaunsar Rajputs, Jaunsar Brahmins and U. P. Baniyas on the other.

Taking into consideration the N.I. factor, the Garhwali Rajputs are akin to Khatri (Punjab), Bihar Brahmins, Newar, Gurkhas, Tibetans,

TABLE No. XX

Hill Peoples	Plains Peoples	
1. Jaunsar Artisans	6. Koltas	U. P.
2. Kulu Kanets	7. Kharwars	U. P.
3. Tharus (Nainital)	8. Artisans	U. P.
4. Brahmins (Manali)	9. Miscellaneous Rajputs	U. P.
5. Doms (Hills) Gorakhpur	10. Chhatri	U. P.
	11. Gwalas	U. P.
	12. Kol	U. P.
	13. Baniyas	U. P.
	14. Lohars	U. P.
	15. Kanjar	U. P.
	16. Brahmins	Bihar
	17. Kahar	Bihar
	18. Khatri	Punjab
	19. Chuhra	Punjab

Limbu, Kulu Kanets, U. P. Artisans, U. P. Koltas, Jaunsar Artisans, Almora Doms, Murmi, Chuhra (Punjab) Gurungs, U. P. Doms, Gorakhpur (Hill) Doms, Tharus of Nainital, Kambu, Bihar Gwala, Chhatri (U. P.), U. P. Kanjar, Gurung, U. P. Baniyas, Bihar Kahars, Kharwar (U. P.), U. P. Gwalas, U. P. Kols and U. P. Lohars, on the one hand, and Shokas of Almora, Rajputs of Rajasthan, Almora Rajputs, Manali Brahmins, Baghel Rajputs, Bhotiyas of Almora, Brahmins of Almora and U. P. Misc. Rajputs on the other.

The above table shows the different hill and plains peoples separated into 2 columns for the sake of convenience, with whom the similarity of the Garhwali Rajputs with respect to Stature, C.I. and N.I. is more. This gives a broad outline of the affinities of these people with the population under study.

There are certain other castes and tribes who show resemblances in two characters namely C.I. and N.I., Stature and N.I., Stature and C.I. The groups falling under these heads are listed below :—

TABLE No. XXI

I C.I. and N.I.	II Stature and C.I.	III Stature and N.I.
1. Doms Almora	4. Brahmins (Jaunsar)	11. Brahmins (Almora)
2. Doms U.P.	5. Rajputs (Jaunsar)	12. Rajputs (Almora)
3. Rajputs Rajasthan	6. Low Caste (Manali)	13. Bhotiyas (Almora)
People from the Preceding table falling in this Category.	7. Rajputs (Manali)	14. Baghel Rajputs (U.P.)
1. Kanets (Kulu)	8. Brahmins (Garhwal)	15. Gwala (Bihar)
2. Tharus (Nainital)	9. Brahmins (U.P.)	16. Limbu (Nepal)
3. Doms (Almora)	10. Bhatus (U.P.)	17. Newar (Nepal)
4. Brahmins (Manali)		18. Gurungs (Nepal)
5. Doms (U.P.)		19. Gurkhas (Nepal)
6. Koltas (U.P.)		20. Gurung (Nepal and Darjeeling)
7. Misc. Rajputs (U.P.)		21. Murmi (Nepal and Darjeeling)
8. Kharwar (U.P.)		22. Tibetans (E. Himalayas).
9. Artisans (U.P.)		
10. Doms (Gorakhpur)		
11. Brahmins (Bihar)		
12. Chhatri (U.P.)		
13. Gwala (U.P.)		
14. Kol (U.P.)		
15. Baniyas (U.P.)		
16. Lohar (U.P.)		
17. Kanjar (U.P.)		
18. Khatri (Punjab)		
19. Rajputs (Rajasthan)		
20. Chuhra (Punjab).		

From the above table it is evident that the Garhwali Rajputs are similar to the rest of the cis-Himalayan people (See Column I and II) with respect to Stature, C.I. and N.I. But with respect to Stature and N.I. they seem to be akin to the preponderantly Mongoloid human group of Nepal and the Eastern Himalayas, and Bhotiyas of Almora, on the one hand, and the high castes of Almora, Baghel Rajputs (U. P.) and Gwala of Bihar, on the other.

There is another point of view to understand the ethnic affinities of Garhwali Rajputs, provided we take into account only two very important anthropometric indices, namely C.I. and N.I. According to this, many castes and tribes will fall under the column I of the table in question, in accordance with which 20 categories have already been listed under Column I.

From the foregoing arguments it is evident that Garhwali Rajputs are akin to a number of peoples of Northern India, (including cis-Himalayan region) and Nepal and Eastern Himalayas which could be grouped in the following main regions including a number of groups.

A : *Cis-Himalayan region* :—

(i) Brahmins, Rajputs and Artisans of Jaunsar, (ii) Kanets of Kulu, (iii) Brahmins, Rajputs and low castes of Manali, (iv) Brahmins, Rajputs and Doms of Almora, (v) Tharus, and Bhotiyas of Kumaon.

B : *Northern Indian Plains* :—

(i) Doms, Koltas, Brahmins, Rajputs (Misc.), Kharwar, Artisans, Bhatus, Baghel, Hill Doms (Gorakhpur), Chhatri, Gwalas, Kols, Baniyas, Lohar and Kanjars of U. P., (ii) Khatri and Chuhras of Punjab, (iii) Rajputs of Rajasthan.

C : *Nepal and Eastern Himalayas* :—

(i) Limbus, Gurungs, Gorkhas, Murmis and Tibetans.

In short Garhwali Rajputs are ethnically allied to the high and low caste people of Northern Indian hills as well as the plains, on the one hand, and to the preponderantly Mongoloid tribes of Nepal, Tibet and Eastern Himalayas, on the other.

Possible ethnic composition of the Garhwali population :—

Remarks A, B and C help us in analysing the ethnic elements with the help of Guha,[1] Hutton[2] and Majumdar[3] (D.N.).

(a) The low caste people of the sub-Himalayan region, like Doms, and of Northern Indian plains, like Koltas, Gorakhpur Doms, Lohars and Kanjars of U.P., and Chuhras of Punjab, have been identified with the "Proto-Australoid type" by Guha as is clear from the following remarks.

"However that be, the Proto-Australoid type is the most dominant element at present in the tribal population of Southern, Central India as well as among semi-hinduised tribes further North. The so called 'exterior castes' of Hindu society throughout the greater part of the country are also mainly constituted from this racial strain".

This opinion is supported by Majumdar who considers the Doms to be the "aboriginal type in the Himalayan region" (Fortunes of Primitive Tribes 1944 — page 112).

(b) According to Guha "Palae-mongoloid strain is found in sub-Himalayan region as the more ancient stratum of the population ...." This mongoloid element might have crossed over from the mongoloid sources across the frontier, perhaps from the Tibetan ....*" ..... Eickstedt also thinks that there is a common racial substratum in all these people with a gradual increase of Mongoloid blood extending upto the western parts of Nepal".

(c) The Northern Indian plains people belong to a number of "strains from several progressive races, of which those belonging to Mediterranean stem — so named from its association with the Mediterranean basin — are the largest" (Guha). Of the Mediterranean stem also it seems that it is the "Mediterranean proper and the so-called Oriental race of Fischer" (Guha) because the distribution of these two ethnic strata is the strongest according to Guha, in the Punjab, but common throughout Sindh, Rajputana and Western United Provinces.

(d) Perhaps a broad-headed element identified as Dinaric by Guha might also have gone into the formation of Garhwali population as 'a subsidiary drift of the Dinaric race probably took place from the North Western Himalayas into Western Nepal. It is present all along the region from Kho and Burusho of Chitral and Gilgit to several racial groups in Nepal, though somewhat intermixed, with a local variant of the Oriental race.

Hence the ethnic elements that have gone into the formation of the Garhwali population can be listed below :—

1. *Proto-Australoid* (Guha) — To Veddid (Eickstedt).
2. *Mediterranean* — (a) Mediterranean proper,
   (b) Oriental of Fischer,
   & (c) Perhaps (?) Palae-mediterranean in an absorbed or partial form as brought by the mixed immigrants from the Northern Indian plains.
3. *Palae-Mongoloid* — From the Mongoloid sources across the frontier.
4. *Western* Brachycephal (Dinaric type) — "from the Dinaric alps" (Guha).

Heterogeneity of Physical characters in Garhwali Rajputs as supported by somatometry and somatoscopy :—

Such a picture of ethnic element indicates that the Garhwali people are a thoroughly mixed lot owing to the heterogeneity of the somatometric characters considered in this paper. The section on somatoscopic observations fully supports such a conclusion, as the Garhwali Rajputs have predominantly the following characters :—

(i) Skin colour — Yellow brown or brown (Inner arm as well as forehead).

(ii) Hair form — Low waves 54.1% and straight (23.4%).

(iii) Hair texture — Medium (69.2%) and coarse (19.8%).

(iv) Hair distribution — Medium 75.4%.

(v) Ear lobes — Large (58.7%) and separate (51.8%) and attached (43.1%).

(vi) Body musculature — Athletic or mesoderm (63.97%) and asthenic (29.06%).

(vii) Prognathism — Absent 82.8% and alveolar (15.12%).

(viii) Chin — Prominent (59.1%) and medium (40.9%).

(ix) Shape of Chin — Oval (51.8%) square (43.1%).

(x) Lips — Medium (51.8%) thick (40.9%).

(xi) Eversion — Absent.

(xii) Forehead Height — Low (69.3%) and medium (24.3%).

(xiii) Forehead Slope — Medium (80.9%) and straight (11.7%).

(xiv) Supra-orbital ridges — Trace 49.2%, moderate (34.8%).

(xv) Nasal Septum — Horizontal (59.4%) upwards (20.9%), downwards (19.7%).

(xvi) Nasal Bridge — Concave (34.8%) straight (25.7%), convex (20.4%) and concavo-convex (19.1%).

(xvii) Eyebrows — Thin (45.4%) and medium (39.7%).

(xviii) Eye-colour — Brown (38.5%), dark brown (37.3%) and light brown (16.2%).

(xix) Eyefold — Absent 89.7%.

(xx) Eyeslit — Oblique (68.6%) straight (31.4%).

(xxi) Hair Colour — Black (70.4%) and dark brown (25.5%).

A NOTE ON A PEDIGREE OF PARTIAL ALBINISM

by

K. C. MALHOTRA

Albinism probably exists in every vertebrate animal as well as in many non-vertebrates, and in plants. Its antiquity in man is extreme; NOAH might have been an albino,[1] and recognisable cases were recorded by booth PLINY[2] and AULUS GELLIUS,[3] as early as the first century A.D. Albinism appears to be found in all races, probably represented by the same gene.[4]

In most of the cases, the whole body, that is, the skin and eyes including hairs, the eye-brows and the eye-lashes are dipigmented. These are the usual albinos (total albinos). But in certain cases the gene behaves in a slightly different manner and the resultant phenotype is quite different from the usual total albinos. These are the partial albinos. The usual cases reported of partial albinism are piebaldism, spotting, a white blaze in the fore-head or other forms of *albinismus conscriptus*.

The actual cause of albinism is not yet very clear. However, the typical complete form of albinism is the result of the absence of the enzyme tyrasinase (tyrosine by series of complex steps, which occurs in specialised cells, *i.e.* the malanocytes, and is responsible for the basic pigment of the human body). The bio-chemical relationship between the various forms of partial and complete albinism is not yet adequately explained.

A survey of the work done so far on total and partial albinism, leads us to the view that, while total albinism is generally a recessive condition, partial albinism is due to a dominant gene.[5]

The purpose of the present note is to report a case of partial albinism which is probably inherited due to a recessive gene.

The pedigree (Fig. 1) described herein, inhabits the jungles of DHARAMPUR Taluka, SURAT District (Gujarat) and belongs to an aboriginal tribe — the WARLIS. Very little is known about the physical characteristics and the genetical variability among these people.*

* A discussion with Dr. A. K. MITRA and Dr. Mrs. KARVE revealed that the WARLIS are made up of two ethnic elements, *viz.*, proto-austroloid and palaemediterranean. An article about the physical characteristics of these people is in progress.

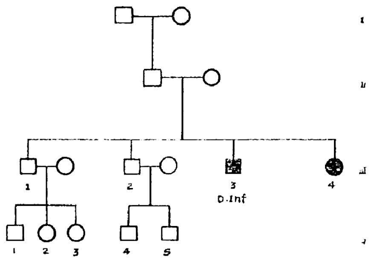

Fig. 1 Pedigree of Partial Albinism. Probably the trait inherited is due to a recessive gene unlike hitherto reported. (D. Inf. — Died in infancy; Solid Square and Circle represent Albinism).

Fig. 2 Photograph of III-4, showing Partial Albinism.

The family pedigree shows that there are only two cases, *viz.* a male and a female, III-3 and III-4 respectively, through V generation who are partial albinos. All the members charted in the pedigree were observed by the author except III-3, who died in infancy. Particular attention was paid in noting down the colour of the skin, eye-pigment and hair. The skin colour was compared to V. LUSCHAN's scale; the eye colour was observed by comparison with MARTIN's chart; hair-colour was observed by comparison with FISCHER's chart.

All the family members except the affected one possess different shades of eye colour ranging from 12-16 (MARTIN's No.s.), and the skin colour ranged from 21-33; whereas, the hair-colour varied from W to Y. The following characteristics were observed in regard to the case III-4, — a female of about 19 years old. (Fig. 2,).

The skin was pigmentless as one finds in the case of total albinos; the hair colour (head) was light-brown (V) except a small tuft near forehead which was pigmentless; eye-lashes were light-brown, whereas no pigment could be observed in the eye-brows; interestingly enough, it was found that the eye-colour was light (MARTIN's No. IV). The male who died in infancy also had the same sort of characteritics as revealed from his father.

The possibility of dominant factors being involved is ruled out as none showed albinism in I and II generations. Therefore, it is more convincing to accept that the trait in this pedigree may be due to a recessive gene unlike hitherto reported. Obviously both the parents must have been heterozygous to the gene in question.

References:

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2. Quoted by FROGGATT, P. 1959-60. Ann. Hum. Genet., London. 24., p. 213.
3. *ibid.*
4. GATES, R. R. 1948. *Human Genetics;* vol. I. p. 272.
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TWO STONE AGE SITES ON THE RIVER CHAMBAL, RAJASTHAN

by

V. N. MISRA and MALATI NAGAR

INTRODUCTION

The Chambal is the most important river of Rajasthan. In the eastern part of the State it forms the principal drainage and receives all the rivers of the area as its tributaries. It rises in Madhya Pradesh near the Mhow Cantonment in 22°27′ N. and 75°31′ E. After flowing for about two hundred miles in Madhya Pradesh, it enters Rajasthan territory near the fort of Chaurasgarh in Kota district and then flows over the Pathar Plateau where its bed becomes narrow. After a sinuous course of thirty miles it receives the Bamani near Bhainsrorgarh. The water here is 1,000 feet above sea level. About three miles away from Bhainsrorgarh there are the famous Chulia Falls on this river. The river continues to flow north-east through Kota district till the extreme end of Rajasthan and then it turns south-east to join the Jumna at Etawah in Uttar Pradesh. The length of the river is about six hundred miles of which about one-third lies in Rajasthan and forms the boundary between Rajasthan and Madhya Pradesh.

Stone tools were first discovered from the Chambal by M. N. DESHPANDE in 1953 when he explored the river at Sonita near Bhainsrorgarh. Here he found pebble tools, handaxes and cleavers in the river bed.[1] Later in 1956-57 S. R. Rao undertook a small digging at Sonita and Bhainsrorgarh (24°56′ N. and 75°34′ E.). At both these places he found a stratigraphic sequence consisting of two gravels superimposed by a deposit of silt. The lower gravel yielded handaxes and cleavers and the upper one Levalloisian flakes and scrapers. A similar sequence was also found at Navghat near Bhainsrorgarh.[2] In the same year the Exploration Branch of the Archaeological Survey of India discovered a few microlithic sites near Bhainsrorgarh.[3]

None of these discoveries has, however, been published in detail. Only brief notices have appeared in the *Indian Archaeology — A Review*.

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1 *Indian Archaeology — A Review* 1953-54, p. 37.
2 *Ibid.*, 1956-56, pp. 5, 8.
3 *Ibid.*, pp. 6, 8.

The collection under study here was made by the authors in December, 1961 when they explored the river at Kota and Rawatbhata. The location of these sites and the stratigraphical observations made there are first described below and then a typological analysis of the lithic material is given.

SITES AND STRATIGRAPHY

1. *Kota* (KTA) 25°10′ N. and 75°52′ E.

It is an important town and a railway station on the Delhi-Bombay line of the Western Railway. The river flows close to the town. It was explored for a total stretch of four miles, two miles on either side of the rail bridge which is nearly a mile to the north-east of the railway station. The right bank shows all along a steep cliff of about sixty feet thickness. This cliff forms the highest terrace level on which the town of Kota is situated. It is composed entirely of silt. The upper three to four feet of silt are blackish in colour due apparently to concentration of humus. The lower part of the silt is light brown or more or less yellowish in colour with occasional patches of whitish or creamy colour. In the lower levels formation of kankar nodules is noticed due to the concentration of calcium carbonate. The silt is being extensively eroded by rain water resulting in the formation of gullies. The eroded material forms a thick talus deposit at the foot of the cliff. No gravel occurs either in the silt or below the cliff and no implements were found here. But south of the bridge close to it a large gravel spread occurs (Pl. II, Fig. 1). Nearly sixty artifacts comprising pebble choppers, scrapers, handaxes, cleavers, and flakes were collected from this spread.

On the opposite bank there is no cliff comparable to that on the right bank. However a lower silt deposit is seen along this bank. This deposit is about 25 to 30 feet high from the water level and might have been formed by the denudation of the higher deposit seen in the background. Therefore it is suggested that these two levels, namely 60 feet and 30 feet on the two sides of the river may be designated as Terrace I (T1) and Terrace II (T2) respectively (Pl. III, Fig. 1). T2 does not form a cliff unlike T1. On the other hand it forms an undulating land surface. The two terraces can be distinguished from each other both by differences in their levels and in the colour of their sediments. The silt of T1 is of yellowish-brown colour while that of T2 is of blackish colour. This feature of T2, however, may be due to higher concentration of humus owing to intensive cultivation going on over it.

No artifacts were found in or on T2. However, ten palaeoliths and twenty-three microliths were collected from the gravel spread at the foot of T2 along this bank. This gravel spread is continuous along this bank and was explored for more than two miles upstream from the bridge.

2. *Rawatbhata* (RBT).

It is a small village about 30 miles upstream from Kota. A dam known as the Pratap Sagar Dam is being constructed on the river near the village. About two miles from the dam site are the famous Chulia Falls on the river. S. R. RAO had reported the discovery of three terraces on the Chambal near the Falls. He had also found tools of Lower and Middle Palaeolithic from this area.[4] We explored the river along both the banks from the Dam site to a little more than a mile below the Falls. The river here is deeply entrenched in a rocky terrain and along the left bank there is a high rocky cliff. We could not find any trace of gravel or silt deposition in the area. Five tools of Lower Palaeolithic were found close to the Pratap Sagar Dam.

INDUSTRIES

In all a total of ninety-six artifacts were collected from Kota and Rawatbhata. Typologically the material can be assigned to three cultural periods, namely the Lower Palaeolithic, the Middle Palaeolithic and the Mesolithic. It is true there is very little stratigraphical evidence for such differentiation of the material from these two sites. But on the basis of our knowledge of the stratigraphical sequence of Stone Age industries on the Chambal and several other rivers in Rajasthan and from many other parts of India such a treatment of the material seems justified. Nowhere in Rajasthan have we found the tools of any two of these three cultures occurring associated in the same stratigraphical horizon. Apart from this purely negative evidence we have the direct stratigraphical evidence from Sonita and Bhainsrorgarh on the Chambal itself. As mentioned earlier at both of these sites RAO found two gravel deposits the lower one of which yielded a Lower Palaeolithic industry of handaxes, cleavers etc. and the upper one a Middle Palaeolithic industry of Levallois flakes, scrapers etc. Further, microliths have so far been found in Rajasthan from surface only and are therefore obviously the latest in the sequence.

LOWER PALAEOLITHIC

Kota

Raw Material and State of Preservation of the implements

Of the implements collected from this site sixty-two can be assigned to the Lower Palaeolithic. All of them are made of quartzite. It is of medium to fine-grained variety. The colour is normally dark-brown or dark-grey but other shades such as light brown or pinkish also occur. The source of the material is the Vindhyan rocks through which the river flows in its middle and upper reaches. The material is available in the form of heavily rolled and thoroughly rounded pebbles which occur in abundance in the river.

[4] *Indian Archaeology — A Review*, 1955-56, pp. 6, 8.

Nearly all the tools have been rolled in varying degrees. But for one or two specimens none can be described as fresh. However as will be seen from the illustrations in Plate IV the flake scars are generally quite clear despite much rolling. There is not much patination on the implements.

TECHNIQUE

A substantial number of implements from Kota belong to the pebble tool category. These have been made by detaching relatively small but thin flakes. These could have been removed by the application of blows with a light stone hammer. The same technique would have been used for producing handaxes and cleavers. There is very little evidence on the tools for secondary flaking by cylinder hammer technique. There is one specimen each of a large core (Pl. IV, Fig. 5 and Pl. X, Fig. 1) and a large flake (Pl. IV, Fig. 6 and Pl. X, Fig. 3). These could have been produced by the application of a heavy stone hammer and it is not necessary to suggest the use of block-on-block or anvil technique. Flakes in the collection are generally thick and many of them have unfaceted platform and limited primary flaking on the upper surface. These also could have been produced by stone hammer technique. As a whole the technological features of the Kota assemblage are primitive.

Tool Types

The total collection of sixty-two implements may be divided into following types :

(1) Choppers and Scrapers,
(2) Forms transitional between choppers and handaxes,
(3) Handaxes,
(4) Cleavers,
(5) Flakes, and
(6) Cores.

(1) *Choppers and Scrapers*[5]

Choppers and scrapers have been clasified into two groups : (i) Pebble choppers and scrapers, and (ii) Core scrapers.

(i) *Pebble choppers* :

These are further divided into, (a) Unifacial, and (b) Bifacial choppers.

(a) Unifacial choppers : These are made on large flat-based pebbles. They are further divisible into two sub-types.

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5 For the terminology of choppers and scrapers employed here see MISRA, V.N. (1962), "Palaeolithic Industry of the Banas, Eastern Rajputana", *Journal of The Asiatic Society of Bombay*, Vol. 34-35, pp. 138-160.

(1) *Edn Choppers.* There are two specimens in this sub-group. Both have identical features.

KTA 1 (14.4 × 10.4 × 6.4)[6] Pl. IV, Fig. 7, and Pl. VI, Fig. 2.

A unifacial pebble chopper of grey quartzite; very little rolled. It is made on an elongated pebble. The working edge is along the broader end and is very steep. It has been prepared by detaching several flakes from the base towards the top. The butt-end is rounded and the upper surface is flat. The lateral margins are thick and steep. Under surface is a flat pebble surface. It is a very fine example of a steep unifacial chopper of Early Sohan type.

Side Choppers. In these the working edge is along the longer axis is much less steep than in the case of the end choppers.

KTA 14 (12.5 × 8.1 × 5.3) Pl. VI, Fig. 5.

A unifacial oval chopper of brown quartizite; much rolled. Dorsal surface almost fully flaked by detaching large but thin flakes from the base towards the top at a low angle. Two of the flakes have been detached from the right margin towards the top. A third flake has been removed from the top towards the bottom. The ventral surface is flat and left unworked save for a few small flakes along the margin. It has a thick unworked back for holding.

KTA 10 (11.6 × 8.5 × 5.9) Pl. VII, Fig. 6.

A small, steep-edged, oval pebble chopper of brown quartzite; slightly patinated. The under surface has a large flake scar. The working edge has been prepared by detaching several flakes from the flat base towards the top.

(b) *Bifacial choppers*: In these the cutting edge is produced by flaking from the two surfaces. There are only two specimens one of which is described.

KTA 4 (17.4 × 11.3 × 6.6) Pl. VI, Fig. 1.

A large oval-shaped, bifacial chopper of dark-brown quartzite; very fresh. Three roundish flakes have been removed from the left margin of the dorsal surface, leaving deep negative scars. Five flakes have been detached along the right margin and one from the centre. The rest of the upper surface carries cortex. The ventral surface has a thick, steep, left margin which is left completely unworked. Along the semi-circular right margin

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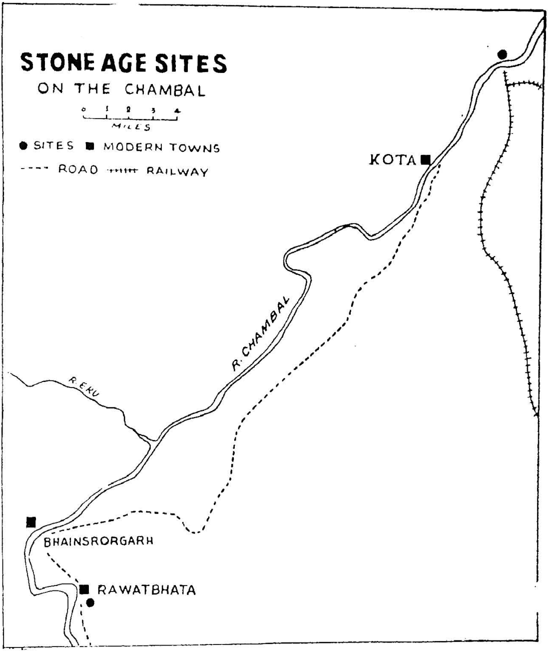
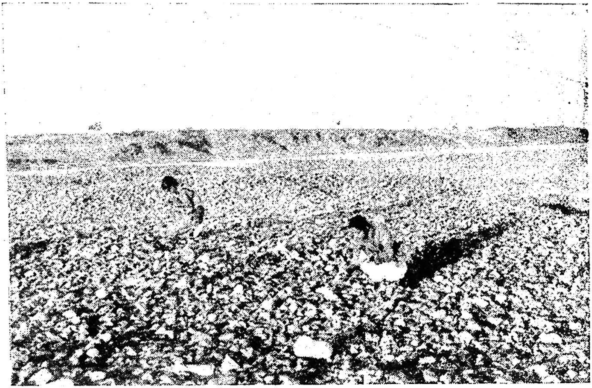
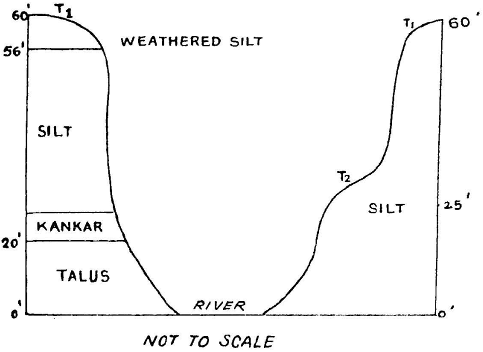
[6] The measurements of all implements are given in centimetres in the order of length, breadth and thickness.


STONE AGE SITES
ON THE CHAMBAL
0 1 2 3 4
MILES
● SITES ■ MODERN TOWNS
---- ROAD ++++ RAILWAY
KOTA
R. CHAMBAL
R. EKU
BHAINSRORGARH
RAWATBHATA

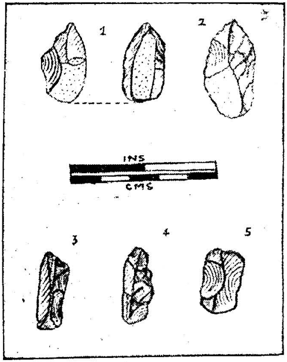


1. Gravel spread along the left bank of the Chambal at Kota with T2 in the background.

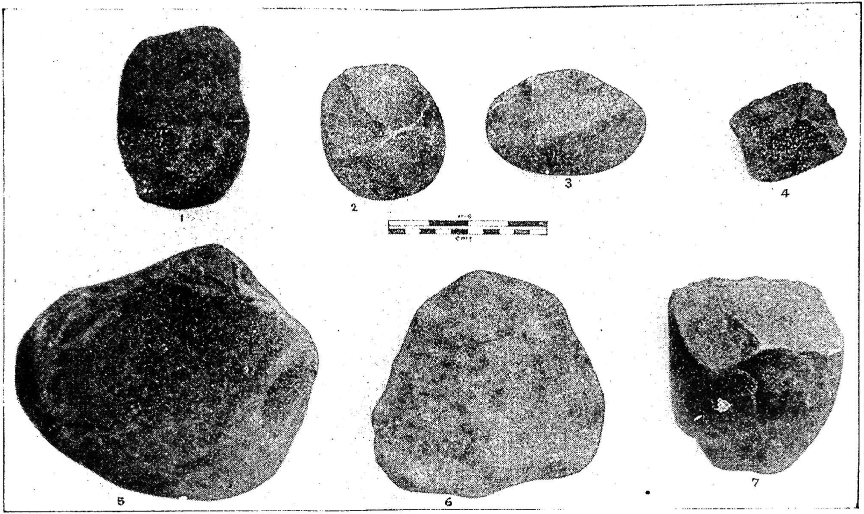
2. A large pebble core in the gravel spread at Kota.



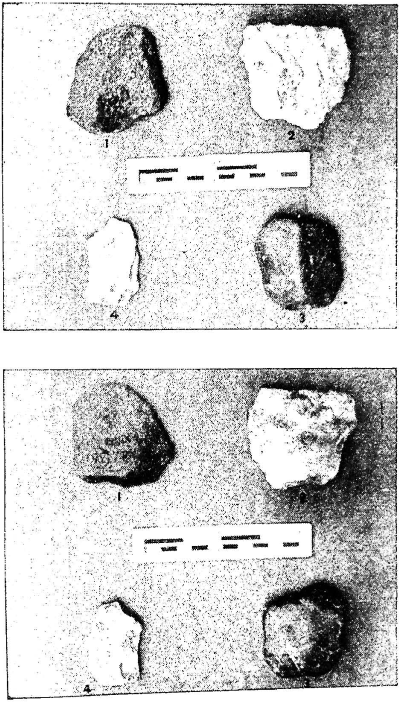
1. Terrace sequence on the Chambal near Kota.



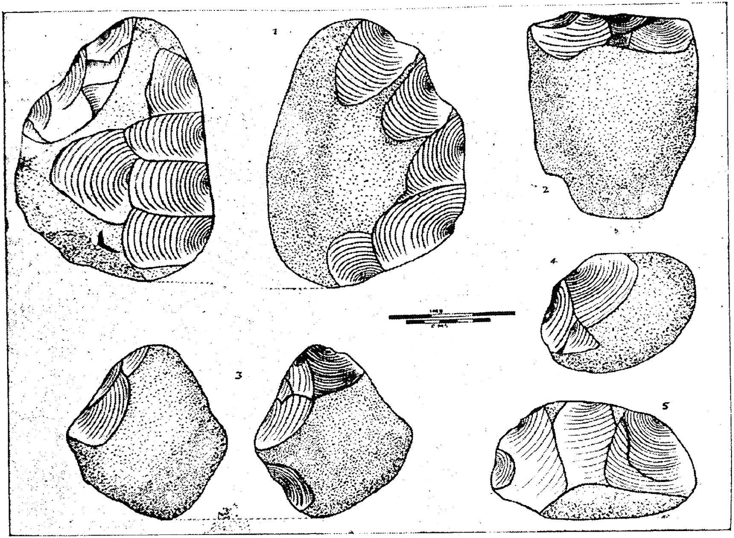
2. Microliths : 1. Bifacial point; 2. End-scraper; 3-4. Blades; 5. Flake.



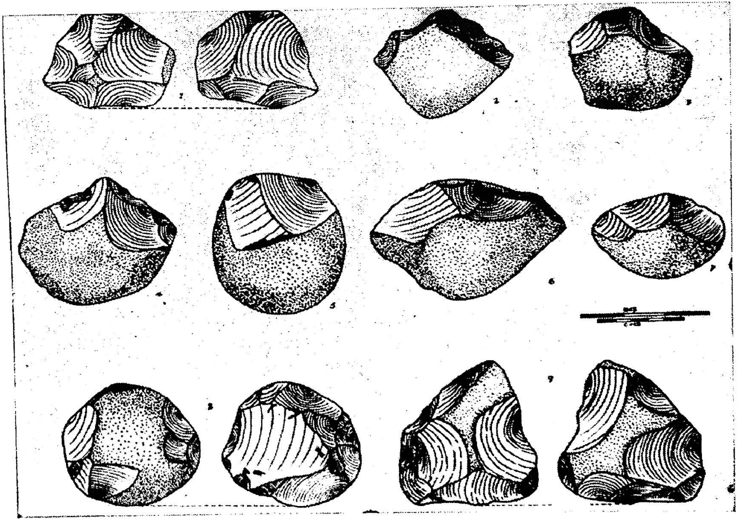
Lower Palaeolithic implements. 1. Rectangular cleaver; 2, 4. End-scrapers; 3. Side-scraper; 5. Large core; 6. Large Flake; 7. End Chopper.



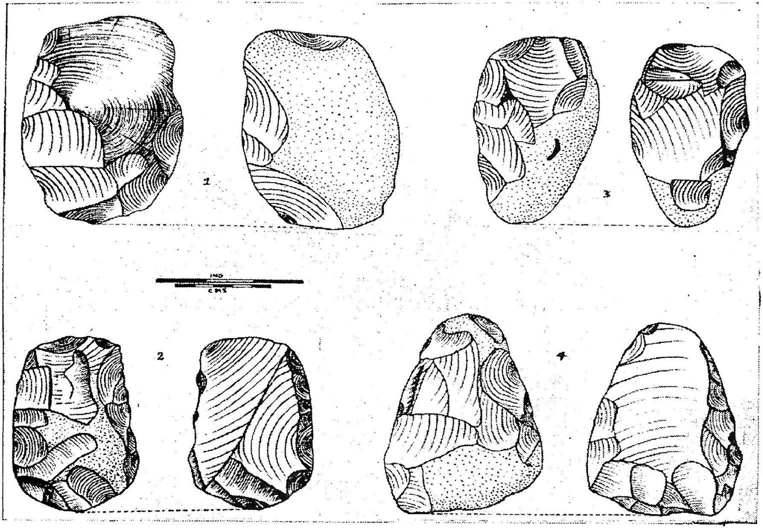
1 and 2. *Middle Palaeolithic Implements.* 1-4. Levallois flakes; Dorsal and ventral views.



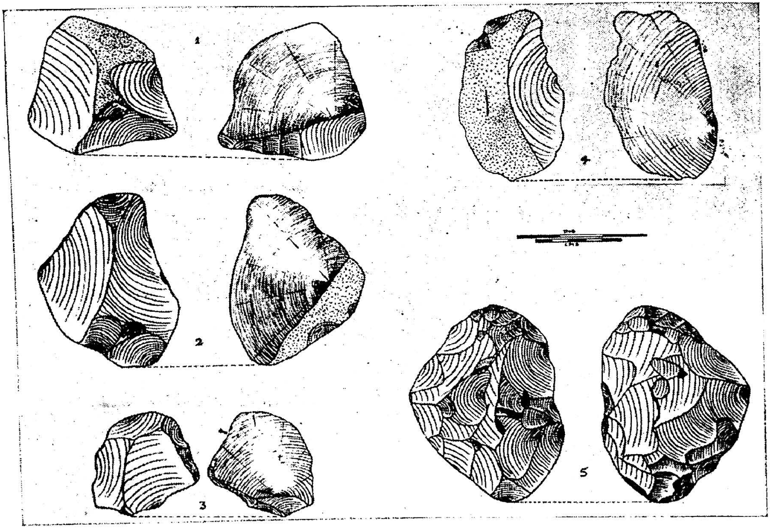
Lower Palaeolithic Implements. 1. Bifacial chopper; 2. End-scraper; 3. Protohandaxe; 4. Side scraper; 5. Side chopper/scraper.



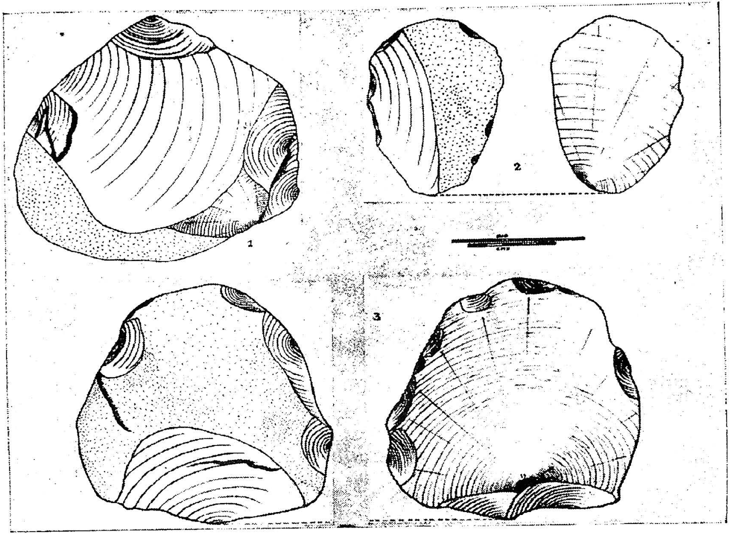
Lower Palaeolithic Implements. 1. Round scraper or core; 2-4. End-scrapers; 6-7. Side scrapers; 8. Round scraper; 9. Core scraper.



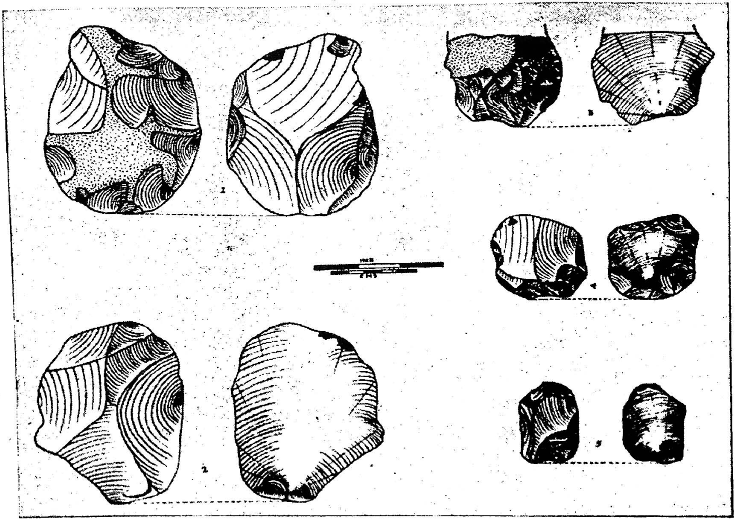
II. *Lower Palaeolithic implements.* 1-3. Cleavers; 4. Triangular handaxe.



1, 4. Partly worked flakes; 2. Fully worked flake; 3. Levallois flake (*Middle Palaeolithic*); 5. Rough ovate.



Lower Palaeolithic Implements. 1. Large core; 2. Partly worked flake; 3. Large flake.



Lower Palaeolithic Implements. 1. Irregular hand-axe; 2. Fully worked flake (Rawatbhata); 3-5. Levallois flakes (*Middle Palaeolithic*).

at least six flakes have been taken off. The tool has an irregular bifacial cutting edge along one margin. Flaking along the right margin suggests that the intention was to produce a hand-axe because this flaking does not produce a working edge. The tool is extremely fresh and gives the impression of being very recent.

SCRAPERS.

These are all of the unifacial type. They are made on flat-based as well as rounded pebbles. The cutting edge may be steep or sloping but the side or end opposite the working edge is always left unworked and being naturally rounded and thick offers an excellent hand-hold. On the basis of the cutting edge the scrapers may be divided into side, end, round, and pointed varieties.

SIDE SCRAPERS :

KTA 34 (10.5 × 7.9 × 4.5) Pl. IV, Fig. 3 and Pl. VI, Fig. 4.

A unifacial scraper made on a small oval pebble of light brown quartzite; slightly rolled. The working edge is prepared by detaching one relatively big and three small flakes at a low angle along one of the lateral margins. The side opposite the working edge is naturally rounded and is very suitable for hand-hold.

KTA 38 (7.8 × 5.9 × 3.6) Pl. VII, Fig. 7.

A roughly circular and flat-based pebble scraper of reddish brown quartzite; much rolled. The scraping edge which is slightly convex has been prepared by removing three flakes from the base upwards at a high angle. The remaining portion on both faces is left unflaked. The side opposite the working edge is thick and rounded for hand-hold.

END SCRAPERS:

KTA 54 (9.8 × 8.1 × 4.0) Pl. IV, Fig. 2 and Pl. VII, Fig. 3.

An oval end-scraper made on a pebble of reddish-brown quartzite; very slightly rolled. An efficient working edge has been produced by detaching two large but thin flakes from one of the margins inwards. The entire remaining portion of the pebble is left unflaked. The end opposite the working edge is beautifully rounded by rolling.

KTA 64 (8.4 × 7.3 × 2.5) Pl. IV, Fig. 4 and Pl. VII, Fig. 2.

A small flat-based pebble scraper of reddish-brown quartzite; quite fresh. It has a very steep and convex working edge which has been prepared by flaking from the flat base towards the top. Flake scars are small and round and show fine conchoidal bulbs.

The end opposite the working edge is pointed. Upper and lower faces are flat and lateral margins steep. Excepting the working edge all the remaining area is cortexed.

KTA 33 (7.2 × 7.0 × 3.5) Pl. VII, Fig. 3.

A small roughly rounded pebble scraper of light brown quartzite, much rolled. It has a rather steep edge produced by detaching small flakes from the flat base towards the top. The lower and upper surfaces are flat and cortexed. The end opposite the working edge is rounded.

ROUND SCRAPERS:

KTA 52 (8.7 × 8.3 × 3.0) Pl. VII, Fig. 8.

A roughly circular, flat-based pebble scraper of light-brown quartzite; much rolled. On the upper face several small flakes have been removed along the periphery but the central portion and part of the margin along the broader end left unworked. The under surface has a large shallow scar in the centre and is worked by step flaking along the entire periphery to produce a suitable edge.

POINTED SCRAPERS:

KTA 50 (9.5 × 2.3 × 3.0) Pl. VII, Fig. 4.

A pointed end-scraper made on a pebble of light brown quartzite; much rolled. Only two flakes have been removed on the upper surface to produce a pointed working edge; rest of this surface bears original pebble cortex. Ventral surface is probably a flake surface but it is too much rolled to be clearly distinguished.

CORE SCRAPERS

These are also made on pebbles but they differ from the pebble tools in that whereas in the latter only the working edge is flaked, the former are much more extensively flaked in the manner of a core.

KTA 8 (10.7 × 9.0 × 3.9) Pl. VII, Fig. 9.

A small, triangular scraper of light brown quartzite; much rolled. From the upper surface one big flake has been detached along the right margin producing a deep negative bulb while four or five thin flakes have been removed along the left margin. The rest of the tool carries natural cortex. From the under surface one large flake has been taken off along the left margin and three or four flakes have been detached along the butt end. All the three sides of the artifact can be used for scraping purposes. The specimen has been classed as a core tool because it is flaked from various directions in the manner of a core.

HANDAXES

There are only two handaxes in the collection. Both are described and illustrated.

TRIANGULAR HANDAXE:

KTA 79 (13.3 × 8.9 × 4.0) Pl. VIII, Fig. 4.

A triangular handaxe of light brown quartzite; very much rolled and slightly weathered. Upper face has been worked by the removal of thin small flakes along the lateral margins. There is some step flaking along the left margin. A considerable area along the posterior end carries cortex. The ventral face is probably a flake surface though it cannot be said with certainty because the tool is much rolled. A few flakes have been detached, some of them by step technique, along the margins as well along the butt end. The edges when seen in profile are more or less straight and the cross section in the centre of the tool is symmetrically biconvex.

OVATE

KTA 74 (12.9 × 8.9 × 2.9) Pl. IX, Fig. 5.

A very thin, elongated, irregular ovate of dark-grey quartzite; much rolled. Its dorsal surface is yellowish brown while ventral surface is more or less dark in colour, due perhaps to its having lain in water for a considerable time. Many flakes of small size have been removed by cylinder hammer technique producing thin, shallow scars. The thinness of the tool suggests that it is made on a flake though its flake origin is difficult to determine because of extensive secondary work on both surfaces. It has sharp working edges along both margins. The tip along the end is well rounded. The specimen is a fine example of Acheulian technique.

PROTO-HANDAXES OR TRANSITIONAL FORMS BETWEEN HANDAXE AND PEBBLE CHOPPER

There are two specimens in the collection which because of their shape and technological features may be described as proto-handaxes or forms transitional between a handaxe and a pebble tool. One of these is illustrated.

KTA 58 (10.1 × 9.0 × 4.6) Pl. VI, Fig. 3.

A pointed pebble tool of greyish quartzite; slightly rolled, the upper face is worked only along the left margin and the lower surface along the left margin and the tip. The remaining portion is left unflaked on both faces. Thus the tool has two unifacial working edges along the two margins which meet in a

tip. It can very rightly be regarded as transitional between a pebble chopper and a handaxe.

CLEAVERS

There are five cleavers in the collection which have been divided into two types.

U shaped Butt and straight edge :

KTA 43 (12.3 × 8.3 × 4.1) Pl. IV, Fig. 1 and Pl. VIII, Fig. 1.

A rectangular cleaver of dark-brown quartzite; much rolled. On the upper surface five flakes have been detached along the left margin and two or three along the lower half of the right margin. The flake scars are shallow though somewhat large. A large scar produced by a flake from the left margin covers the entire posterior part of the tool and extends upto the butt-end. The ventral surface which is flat in the centre and slopes along the margins has been left unflaked except for one or two scars along the left corner of the butt end. A large scar along the upper half of the left margin is of recent origin. The tool is partly broken. It has a working edge along the entire periphery and it could also be considered an elongated ovate.

KTA 44 (10.7 × 6.7 × 2.6) Pl. VIII, Fig. 2.

A small, thin U shaped cleaver of reddish brown quartzite; very much rolled. It is fully worked on both faces leaving no cortex. Upper surface is flaked all over by detaching very small and thin flakes by wood hammer technique. The under surface has two large scars covering the entire face while the butt end is worked by detaching three or four small flakes. It has a sharp edge along the entire periphery. Though the original freshness and sharpness of the tool is gone because of rolling, it still remains a good specimen because of its fine workmanship and overall symmetry.

POINTED BUTT AND STRAIGHT EDGE

KTA 27 (11.9 × 7.0 × 4.1) Pl. VIII, Fig. 3.

A U shaped cleaver of dark brown quartzite; slightly rolled. On the upper surface one large flake has been taken off along the cleaver edge. The entire right margin, central part and butt-end are left unflaked. The ventral surface is almost flat and nearly fully worked. The right margin has two shallow scars. Another big scar covers the rest of the surface except the butt end.

FLAKES.

Flakes are generally medium-sized varying from nine to twelve centimeters in the longer dimension. They generally have unfaceted plain

platforms and flake angles above 100°. Most of them have some primary flaking on the upper surface but none is sufficiently retouched to be called a scraper. On the basis of the amount of primary flaking on them they have been classified under the following heads.

CORTEXED FLAKES.

KTA 75 (16.2 × 15.0 × 5.5) Pl. IV, Fig. 6 and Pl. X, Fig. 3.

A roughly triangular flake of dark brown quartzite; slightly rolled. It has two scars on the striking platforms. The angle between the bulb of percussion and the main flake surface is 75° and the bulb of percussion is quite prominent. Small chips have been sporadically removed from both the margins. Upper face has one large scar along the anterior end. Two large but thin flakes detached along the right margin and one small flake along the left margin. Rest of the upper surface carries cortex.

PARTLY WORKED FLAKES.

KTA 83 (11.7 × 7.9 × 3.0) Pl. X, Fig. 2.

An oval flake of light brown quartizite; much rolled. It has a convex edge opposite the bulbar end. The sides are straight and they taper gradually to a rounded butt. There is one large scar along the left half of the upper surface; the rest of this face is left unworked. Several small chips have been taken off along the left margin. The lower surface is a clean flake surface. It has a weak bulb of percussion, a very small striking platform and a flake angle of 90°. It could have been used as a scraper.

KTA 26 (9.8 × 8.9 × 3.3) Pl. IX, Fig. 1.

A roughly triangular flake of whitish quartzite; it is slightly rolled but heavily weathered on the upper surface. The dorsal surface exhibits three large flake scars, one each along the left and right lateral margins and the posterior end. The remaining portion on the upper surface is natural cortex. It has a large faceted platform, a prominent bulb of percussion and a flake angle of 132°.

KTA 25 (11.7 × 6.3 × 4.1) Pl. IX, Fig. 4.

A roughly rectangular flake of light brown quartzite; slightly rolled. It has a cortexed striking platform, a very prominent bulb of percussion and a flake angle of 87°. The under surface has two or three small scars along one of the narrow ends but these might be due to use or natural fracture. Upper face is very thick in the centre. It has one large scar along the right margin; the rest of the surface is left unworked.

FULLY WORKED FLAKES.

KTA 5 (11.3 × 8.3 × 3.1) Pl. IX, Fig. 2.

A roughly triangular flake of light brown quartzite; very much rolled. It has a large, natural striking platform, a diffused bulb of percussion and a flake angle of 123°. Upper surface has a longitudinal ridge which runs from the pointed tip to the left corner of the broader end. Two large flakes have been removed from this end, one each on either side of the ridge. The flake scar along the left margin shows a deeper negative bulb than that along the right margin. There is no secondary work on either face.

CORES.

There are two simple cores in the collection with nothing particular about them. Another specimen which could also be classified as a core has been classified as a steep scraper because it has a characteristic scraping edge.

KTA 77 (18.7 × 18.2 × 7.0) Pl. IV, Fig. 5 and Pl. X, Fig. 1.

A very large, round core of dark-brown quartzite; slightly rolled. From the upper face one big flake has been taken off producing a deep negative scar. Two or three small chips have also been detached along the margins of the bigger flake scar. Lower face is almost flat and unworked.

The lower Palaeolithic assemblage of Kota primarily consists of pebble tools. The number of handaxes and cleavers is proportionately very small. The large percentage of pebble tools is perhaps due to the readily available supply of large number of pebbles of all shapes and sizes which might have promoted the tendency to manufacture the tool for the job in hand and discard it easily when its utility was over.

Rawatbhata

From Rawatbhata only five tools were collected. All of them were surface finds. These comprise two irregular handaxes and three partly or fully worked flakes similar to those of Kota.

One specimen of each is described below :

RBT 1 (13.0 × 9.3 × 4.6) Pl. XI, Fig. 1.

A roughly oval pointed handaxe of light brown quartzite; much rolled. Both dorsal and ventral surfaces exhibit the removal of flakes by primary flaking. Some secondary work is also seen. Flaking is quite irregular which has produced sinuous edges. On the upper face one large flake has been removed along the left

margin while one big and four or five small flakes have been removed along the right margin. On the under surface three large but thin flakes have been removed.

RBT 4 (11.6 × 8.9 × 3.1) Pl. XI, Fig. 2.
A roughly oval flake of whitish-grey quartzite; slightly rolled. It has a faceted platform, a diffused bulb and a flake angle of 108°. Upper face is fully worked by detaching large primary flakes. It has a median ridge running from the tip to the bulbar end. The flake has a sharp edge along both the margins and the side opposite the bulbar end while the bulbar end itself is thick.

MIDDLE PALAEOLITHIC

From Kota six flakes were found which can be assigned to this period. Four of them are of chalcedony and one each of chert and quartzite. All of them are worked on the upper face in the Levallois fashion. Though there are occasional marks along the margins, which might be due to use, none of the flakes is sufficiently well-retouched to be classified as a scraper. Four of them are illustrated and described below.

KTA 36 (6.2 × 6.5 × 1.6) Pl. V, Fig. 1 and Pl. IX, Fig. 3.
A small, thin flake of dark-brown quartzite; very slightly rolled. It has a faceted striking platform, a diffused bulb of percussion, and a flake angle of 90°. Upper face is fully worked and the centrally directed flake scars indicate preparation of the flake before its removal from the core in the Levalloisian fashion.

KTA 84 (7.2 × 5.6 × 2.0) Pl. V, Fig. 2 and Pl. XI, Fig. 3.
A small trapezoidal flake of white chert; unrolled. It has a faceted platform, a fine conchoidal bulb, and a flake angle of 100°. Upper face is marked by several small scars detached by a soft hammer. There is a cortical patch along the broader end. Originally this might have been pointed, but in its present condition it is broken.

KTA 15 (5.3 × 3.5 × 1.6) Pl. V, Fig. 5 and Pl. XI, Fig. 5.
A thin, rectangular-shaped flake of whitish chert; slightly rolled. It has a faceted platform, a diffused bulb, and a flake angle of 115°. The upper face is marked by shallow skimming scars detached by the use of a soft hammer. Three small chips have been removed along the tip on the upper surface.

KTA 85 (6.3 × 5.9 × 3.1) Pl. V, Fig. 3 and Pl. XI, Fig. 4.
A small, thick, roundish flake of dark-brown jasper, very heavily rolled. It has a faceted platform, a prominent bulb of percus-

sion and a flake angle of 115°. The upper face has a median ridge and one large flake scar on either side of this ridge. Several small flakes have been detached along the anterior end and both the faces.

MESOLITHIC

Twenty-three microliths were found at Kota in the gravel on the left bank of the river. They have undoubtedly been washed down from some nearby source. Unfortunately we did not have enough time to look for the provenance of these artifacts. They are all made of chalcedony and include points, blades, scrapers, and primary and waste flakes. Though the artifactual as well as contextual evidence is limited, it would suggest them to be mesolithic rather than chalcolithic in character. Five of them are described below.

KTA 86 (2.7 × 1.6 × 0.7) Pl. III, 2, Fig. 1.

A small, bifacial point made on a nodule of white chalcedony; slightly rolled. Upper face has two or three scars along the tip and one along the left margin; under-surface is fully worked along the margins but is left unworked in the centre.

KTA 87 (3.3 × 1.8 × 1.1) Pl. III, 2, Fig. 2.

An elongated end-scraper of whitish chalcedony; slightly patinated. It is very steeply worked along the pointed end to produce a steep scraping edge. A small area along the lower corner of the left margin is left unflaked.

KTA 88 (2.6 × 1.1 × 0.5) Pl. III, 2, Fig. 3.

A small blade of whitish chalcedony; patinated light yellow. Upper face has a median ridge. There is one long scar parallel to the ridge along the left margin and three small scars along the right margin.

KTA 89 (2.6 × 1.2 × 0.4) Pl. III, Fig. 4.

A small, thin blade of bluish chalcedony; slightly patinated. It has a median ridge on the upper face. There are two scars along the left margin; the right margin is retouched by detaching several small flakes.

KTA 90 (2.2 × 1.5 × 1.1) Pl. III, Fig. 2, Fig. 5.

A small, rectangular flake of bluish chalcedony. Upper face has several primary flakes scars. One end is slightly retouched.

INVENTORY OF TOOL TYPES FROM KOTA AND RAWATBHATA.

LOWER PALAEOLITHIC

	Kota	Rawatbhata	
Unifacial end choppers	2		
Unifacial side choppers	6		
Bifacial choppers	2		
Side scrapers	12		
End scrapers	7		
Round scraper	1		
Pointed scrapers	5		
Core scrapers	2		
Proto-handaxes	2		
Irregular handaxe		2	
Triangular handaxe	1		
Ovate	1		
U shaped cleavers	3		
Pointed butt cleavers	2		
Cortexed flakes	5		
Partly worked flakes	6	1	
Fully worked flakes	3	2	
Cores	2		
	62	5	Total 67

MIDDLE PALAEOLITHIC

Levallois flakes	6		Total 6

MESOLITHIC

Points	3		
Scrapers	3		
Blades	5		
Flakes	7		
Chips	5		
	23		Total 23
Aggregate total	96		

AN INTERESTING VIṢṆU IMAGE FROM BAIJNATH (DISTRICT ALMORA)

by

K. P. NAUTIYAL

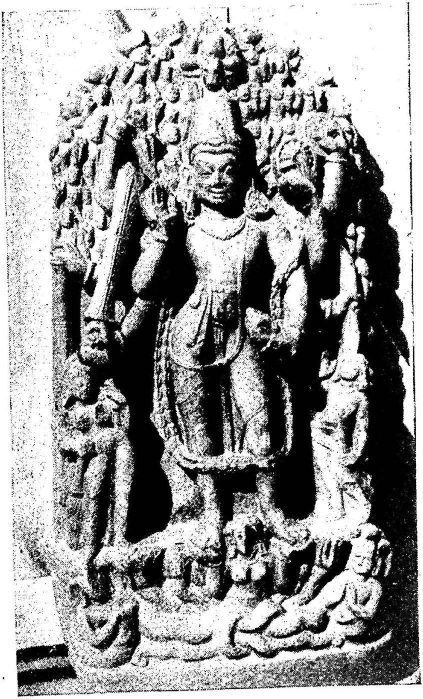
The icon under discussion here was examined by the author at Baijnāth during his exploratory tour of Kumaon.

The accompanying plate (fig. 1) depicts the stone image of Viṣṇu with many and varied characteristics. Other images of the god and his incarnatory forms are numerous in the temples of Kumaon bearing almost all the identical features that have been laid down in the iconographical texts. This representation is, however, curious and from its appearance it can be surmised that the adoption of some new element of thought brought it out in an interesting form.

The sculpture depicts Viṣṇu standing in *dvibhaṅga* pose on the upraised palms of earth goddess, who is herself seen being issued forth from the coil of the snakes. Two nāgas with folded hands seated below at the fringes possibly represent the Ādi and the Śeṣa nāgas. The god has eight arms, of which one on the right is broken. His right hands hold the following objects : top first is broken. The second and fourth hold a *musala* and a *khaḍga* respectively, while the third is shown in the *abhaya-mudrā*. In the left hands from the top he bears the *kheṭaka*, *chakra*, *hala* and *śaṅkha*. He is decked with the *kirīṭa-mukuṭa*, *kuṇḍalas*, *hāra*, *kaṅkaṇas* and *yajñopavīta*. A *vanamālā* flows right upto the knees. He is adorned with a *udarabandha* and a tastefully decorated garment which reaches his knees.

On the right side bottom stands in *atibhaṅga* a female figure holding a *chauri* (fly-whisk) in the right hand, and in other some indistinct object, which rests on the breast. She too is adorned with the *kuṇḍalas* and a decorated garment reaching upto the legs. Her coiffure is decently arranged making it perfectly stylish at the back. On the right stands a male figure in *kaṭihasta* pose having dishevelled hair. He wears a *hāra* and a small waist-garment.

There are multi-faces and miniature figures shown around the head of the main deity. The hands of most of them stand in the *abhaya-mudrā*. On top of the god's head is seen a horse-faced figure raising his right hand in the *abhaya-mudrā*. The topmost portion of the crown is occupied by a



An Interesting Viṣṇu Image
from Baijnath (District Almora)
(Fig. 1)

broken pot-bellied figure seated in the *kamalāsana* pose. He holds a round object in the upturned palm of the left hand which rests on the thigh.

With all the aforesaid features, it remains now to ascertain the motive of such a representation.

From what is seen in the image, it is appropriate to call it in a general way the Virāṭarūpa or Viśvarūpa, combining the features of Balarāma in particular and in a lesser degree the idea of god's manifestations making it entirely synthetical in all the aspects. Images of this type have been reported from Īdar (Gujarat)[1], Kanauj (Uttar Pradesh)[2] and Aligarh[3] in the same province. However, the icon from Kanauj seems to be more interesting and in many ways resembles the present icon strikingly. After a close observation of both the icons, it is gathered that both of them, though coming from two different geographical regions, belong to one and the same school of thought. But the mode of presentation in both the icons differs markedly. The Kanauj image portrays very clearly the principal *avatāras* emerging out of the head of god. The *Viṣṇudharmottara Purāṇa*[4] description tallies with the present image from Kanauj. With four faces and eight hands the deity may be preferably known as *Vaikuṇṭha*. But the combination of other figures around the head makes it more elaborate, and, therefore, the name *Viśvarūpa* in the present case would be more correct. SIVARAMAMURTI, while describing the iconography of such images, says that they contain the *Ekādaśarudras* and *Dvādaśādityas* in the proper left and right of god's head. The Baijnāth image, however, deviates from the above characteristics. Though the figures on the left side of the head raise their hands in the same fashion as the Surya icons — the idea being obviously to show the *ādityas* — it cannot be said that they are as many as twelve. The figures indicating eleven *Rudras* do not hold trident as they are shown in the Kanauj image. With the present diversities in the icon, it is difficult at the present state of our knowledge to point out the reason for such a disparity. The figures in all — including the main — are thirty six. In the case of Kanauj image SIVARAMAMURTI has applied the *Purushasūkta* and the *Viśvarūpa* version of the *Bhagavadagītā*. The Kumaon sculpture from its appearance, however, carries a different analogy. In this context, therefore, the doctrine of the *Pañcharātrins* needs to be viewed taking into consideration the descents of the god. As stated above, the image bears thirty six figures. The *Ahirbudhnya* and the *Sattvata Saṁhitās* state that the

1 SHAH, U.P., "Gupta Sculptures from Idar State (Gujarat)", J.I.M., Vol. IX, Pl. XIX, Fig. 37-38.
2 SIVARAMAMURTI, C., *Indian Sculpture*, p. 99, Pl. 33, Bom. 1961.
3 NAGAR, M.M., "A Visnu Image from Aligarh", J. U. P. H. S., Vol. XVIII, p. 98-100.
4 SHAH, Priyabala, *Viṣṇudharmottara Purāṇa* (Gaekwad Oriental series no. CXXX-III), pp. 218-19.

principal manifestations or avatāras are thirty nine. The list of these *Saṁhitās*, however, seems to be exhaustive. But the statement of Varavaramuni in his commentary on *Tattavatraya* that "the real number is thirty six",[5] if accepted, would go well with the present image. Since the departure of four heads of his main *avatāras* is prominently visible in the present icon, it cannot be named as *Vaikuṅṭha*. Nevertheless, as noted before, the image belongs to the same school of thought accepting certain interchangeability in the rigid rules of iconography. And therefore, it would not be inappropriate to call it also a *Virāṭarūpa Viṣṇu*.

As briefly stated, the Balarāma traits are characteristically visible in the image. It will be in the fitness of things to consider the established iconographical principles relating to Balarāma. The *Bṛihat-Saṁhitā* stresses that "Baladeva should be shown with a ploughshare in his hand and his eyes should be round and rolling indicating his inebriety; he should wear only one ear-ring and his body should be white like a conch shell moon or a (white) lotus".[6]

The Viṣṇu and Balarāma traits visible in the present icon should be considered individually. The *khaḍga, charkha, saṅkha, kheṭaka* and *vanamālā* are the emblems of Viṣṇu, while the traits of *Balarāma* are exhibited by the ploughshare in the left middle hand, the *musala* in the middle right hand, the rolling eyes due to intoxication and the eminent ear-ring in the left ear. The hair also look tied together — a Balarāma feature — but nothing can be definitely said since the *kirīṭa-mukuṭa* covers the entire fore-head.

One important point should be mentioned here. The attributes held by the image are not in conformity with the order. In the later literature different features have been laid down for both the *vibhava* and *vyūha Saṁkarṣaṇa*. It is said that the former should possess two or four arms with a canopy of snakehood, while the latter should hold the emblems of Vasudeva-Viṣṇu in his four hands in the prescribed order. In the case of this image, however, we do not see any acceptance of the prescribed order. The *chakra*, instead of being held by the right hand, is carried by the middle left hand. The other emblems *musala, hala* and *śaṅkha* are quite in order. The variation in the present icon cannot be taken in any way to be surprising since it is the outcome of various complex principles. Balarama's features, undoubtedly, found place in it, but that only in a wider sense. The image had probably some definite message of its own and so the rigidity was, quite obviously, overlooked in many ways.

Apart from all the above characteristics, the horse-faced and pot-bellied figures are worth consideration. The horse face is not new to this

[5] SCHRADER, F. Otto, *Introduction to Pañcharātras*, p. 44.
[6] BANERJEA, J.N., *The Development of Hindu Iconography*, p. 423.

image only. On the *prabhāmaṇḍala* of the Viṣṇu image from Aligarh, referred to earlier, we see a horse-faced figure. This horse-faced figure also occurs in the Kanauj image. The particular figure is known as Hayagriva in the *Saṁhitās.*[7] The pot-bellied figure is probably none but *Brahmā.* It however, bears a round object in his upturned palm, which cannot be definitely identified because the figure is highly obliterated. Besides, the image consists of some reclining heads in the upper end of the rim. They are decked with *jaṭā-jūṭa* and big *kuṇḍalas.* In the Kanauj image the same features discernible are characterised by SIVARAMAMURTI as the *ashṭabhairavas* or eight Bharavas. In the case of Baijnāth image, nevertheless, it is not safe to apply the same analogy. Firstly, both the images carry a dissimilarity in the portrayal of the nature of these faces. The Kanauj image illustrates them with varied dispositions, while the Baijnāth icon keeps them only in the *saumya* propensity. Another noteworthy point is that the heads are nine rather than eight; the last one partially appearing near the *kheṭaka.* Nothing definite can be deduced as to why the icon adopted so many varied elements. Nevertheless, it can be speculated that its presentation focussed on the extensive theme of *avatāravāda,* which was once very popular among the later *Pañcharātrins.*

The two figures attending upon the god are worthy of notice. The female figure on the right may probably be taken as Revatī Devī, the consort of Balarāma. Since the features of this god found a prominent place in the present icon, the assumption of the presence of his consort may also find some justification. Her features as given by RAO state that she should be clothed in *Puṣpavastra,* a term which may mean a cloth in which are worked out floral designs.[8] In this image, she is adorned with a well decorated garment. One variation may, however, be noted in connection with the *chauri* (fly-whisk). It replaces a flower in the hand. The other figure may be identified either with some attendant or Garuḍa, the mount of Viṣṇu. But any definite conclusion about this cannot be made out at present.

As noted briefly, the present icon reflects on the manifold ideas of the *Pañcharātrins.* This type of image was produced generally after the early mediaeval period. Prior to the Gupta period almost all the extant Viṣṇu images are single-faced. It is only during the Gupta period that the multi-headed Viṣṇu image appears for the first time. The reason for it is apparent. The *Pañcharātrins* had their stronghold during the Gupta period, and the Gupta rulers seem to have patronised them more than any other cult. From the beginning of early mediaeval period, Kashmir was the first to witness the preponderance of this cult. Many Viṣṇu

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7 SCHRADER, F. Otto, *Op. Cit.*, p. 46.

8 RAO, T.A.G., *Elements of Hindu Iconography,* Vol. I, Pt. I, p. 202.

icons of this type have been discovered from Kashmir and some adjacent areas.[9]

Similar to the other places of India, Kumaon has several sculptures bearing witness of this trend. Almost all the images of Viṣṇu after about 9th century A.D. incorporate in them highest elaborations. Instance may be supplied about one more image from Baijnāth itself, which contains the figures of god's incarnation around the stele of the sculpture. We cannot point out the meaning of such elaborate images. It, however, seems that the collective worship of all the manifestations of Viṣṇu was very popular among the *Pañcharātrins*.

The date of this image from its general characteristics appears to be the 9th. -10. Century A.D. The sculptural collection in the Baijnāth museum has been divided in three groups on its stylistic considerations. The 9th-10th Century sculptures bear a comparative liveliness of action and tolerable bodily anatomy. As this icon, under study, carries complete harmony with this group, there cannot be any hitch in assigning it also to the same period.

[9] KAK, R.C., *Handbook of the Archaeological and Numismatic sections of Sri Pratapa Singh Museum, Śrinagar*, p. 15.

KRIYĀSAMĀSAS[1] IN MARĀṬHI

by
R. N. VALE

Kriyāsamāsas or Verb-compounds in Marāṭhī is a living problem of modern linguistics. It has engaged the attention of Marāṭhī scholars for more than a century. Indeed the problem is vast and a little knotty ; but, as the scholars could not get over their prejudices, they have hitherto treated it either as an innovation or as a foreign plant. Consequently, for want of a right approach, the problem, in its present state, has become all the more burning and controversial. In the circumstances, the author of this paper deems it necessary to investigate the whole problem afresh with due regard to its controversial history and linguistic applications with a view to arriving at some dependable conclusion.

In his introduction to the *Dictionary of the Marathi* language MOLESWORTH[2] appears to be at great pains to impress upon the minds of indigenous scholars the utility of verb-compounds for the enrichment of Marāṭhī language and literature. MOLESWORTH's wide appeal is itself an indication of the controversy raging among the scholars over the acceptance or the rejection of this category. Before MOLESWORTH, missionary grammars as well as DADOBA's grammar[3] had recognised this

1. The term *Kriyāsamāsa* is coined by me to convey the idea of verbal composition in general and is presented to the world of scholars for their consideration, approval and use. I have used the term in the title of this article for drawing the attention of linguisticians, grammarians and text-book writers. Ever since the publication of my doctoral thesis viz. Verbal composition in Indo-Aryan, I had a strong desire to write a book on *kriyā-samāsas*, verb-compounds or compound verbs in each of the several New Indo-Aryan languages recording full sentences depicting spoken, lexical and literary usage. I had started by contributing a paper viz. 'Linguistic introduction to Verbal Composition in Marāṭhī' to the All India Oriental Conference, Nagpur Session, 1946. But due to a number of unavoidable difficulties I could not do the needful so far.

2. MOLESWORTH, J.T. and CANDY....*Marāṭhī and English Dictionary*, 2nd Edition. 1857: Preface: viii. 14 (= 'Verbal Composition in Indo-Aryan', introduction p. 1).

3. TARKHADKAR DADOBA : *Mahārāṣṭra Bhāṣecē Vyākaraṇ*, 1st Edn. 1836, 10th Edn. 1894: auxiliaries:—381 to 383; 466, 467, 475, 476, 481, 482 to 496.

BALANTYNE John R. : *A grammar of the Mahratta Language* : Edinburgh : 1939 : page 28 and 34. ('Nominal compounds are formed by conjugating a verb with a noun in the nominative — Ex. pujā karṇē, to worship. Potential, optative and inceptive compounds are formed by conjugating the verbs sakṇē to be able, icchaṇē to wish and lāgṇē to come in.)

usage. However, its genuineness was not proved or sanctioned by Panini's grammar. Comparative studies by BEAMES,[4] HÖRNLE[4] and others who followed MOLESWORTH were very short and therefore could not carry conviction. KRISHNASHASTRI CHIPLUNKAR and KRISHNASHASTRI GODBOLE[5] were a little reserved in their support to these compounds, whereas Rev. NAVALKAR,[6] KHER,[6] R. GODBOLE,[6] Principal AGARKAR[6] and JOSHI[6] gave their unstinted support. Of these only Mr. JOSHI changed his view later on. The latest and the last critical exponent and warm supporter of verb-compounds in Marāṭhī was Mr. M. K. DAMLE.[7] As against these there was a section of scholars like RAJWADE,[8] APTE,[8] BHIDE[8] and MODAK[8] who denounced this category in no uncertain terms. They attacked DAMLE and his predecessors like KHER vehemently and declared that verb-compounds as such are a foreign plant and do not conform to the genius of Marāṭhī language. The Marāṭhī Vyākaraṇa committee,[9] and later Mahārāṣṭra Sāhitya Pariṣad although permitting this category to remain, permitted it only as an inevitable evil. In his '*Peśave Daparātīl Marāṭhī Bhāṣecē Svarūp*' Dr. GRAMOPADHYE[10] merely refers to the controversy without suggesting a solution, whereas Dr. TULPULE[11] holds these compounds as an innovation synchronous to the rise of NIA languages.

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4. BEAMES John : *Comp. Grammar of the Modern Aryan Languages of India*: Vol. III (the Verb) pp. 215 ff.

HOERNLE : *Comp. Grammar of Gandian Languages* : p. 173, § 353.

5. GODBOLE KRISHNASHASTRI'S *A new grammar of Marāṭhī language* : 1st Edn. 1867, 3rd Edn. 1895, Bombay: (The author is afraid to call the roots $\sqrt{}$jā, $\sqrt{}$ye and $\sqrt{}$bas as auxiliaries on the ground that he will be compelled to call $\sqrt{}$ne, $\sqrt{}$rāh and $\sqrt{}$suṭ also auxiliaries. He insists on calling the finite verb as the principal verb.)

CHIPLUNKAR KRISHNASHASTRI'S '*Marāṭhī vyākaraṇāvarīl nibandh*': 3rd Edn., 1923, Poona : pp. 190 ff.

6. Rd. NAVALKAR, G.R. .... '*Student's Marathi Grammar*' 1880, Bombay, pp. 123 to 171.

KHER, A.K. .... '*A higher Anglo-Marathi Grammar*', 1895.

GODBOLE, R.S. .... '*Marathi Bhāṣecē Mādhyamik Vyākaraṇ*', 1897.

Prin. AGARKAR .... '*Vyākaraṇ-Mīmāṁsā āṇi vākyācē pṛthakkaraṇ*, 1888, Poona:

JOSHI, R.B. .... (1) *A Comprehensive Marathi Grammar*, 3rd Edn., 1900. (2) *Prauḍhaboha Vyākaraṇ*, 7th Edn., Poona, 1925, pp. 318 to 325.

7. DAMLE, M.K. .... '*Śāstrīya Marāṭhī Vyākaraṇ*' (1908), 1911, Bombay, pp. 201 ff.

8. RAJWADE, V.K. (1864-1926) .... *Tiṅanta-Vicāra* (1917).

APTE, N.V. .... *Vyākaraṇ Prabodh*, 1917, Poona (contains review by Bhide, V.V.).

MODAK, G.K. .... *Marāṭhīcē antaraṅgardarśan*, 1932, pp. 211 to 223.

9. *Marāṭhī Grammar Committee Report*, published in the Prāthamik Śikṣaṇ, March 1931.

10. GRAMOPADHYE, G.R. .... *Peśve daptarātīl Marāṭhī bhāṣecē Svarūpa*, 1941, pp. 254 to 264.

11. TULPULE, S.G. .... *Yādavkālīn Marāṭhī Bhāṣā*, 1942, Bombay, pp. 255 to 263.

Notwithstanding this controversy the usage of verb-compounds became extremely popular. It did not wait for the sanction of grammar. Without it people must have felt the difficulties of communication as they had no other means to express different stages and nuances of action. Indeed it is a pleasure to watch this race in which language has outstripped grammar by centuries.

Here it is worthwhile to take into account all the arguments advanced by the opponents as well as certain debatable views sponsored by the supporters before we make any attempt to deal with each of them establishing side by side an evolutionary process of verbal composition from Old Indo-Aryan to the New Indo-Aryan stage. On a clear analysis we get the following thirteen issues. It is only for the sake of convenience and clarity that I have singled out every issue and treated it separately. To be sure, my treatment in each case is based on solid facts carefully selected for the purpose.

I. That the category of verb-compounds is postulated on the score of Arthāpatti (= Presumption) as grammarians could not account for it otherwise.

This is an allegation made by Mr. APTE in his *Vyākaraṇ Prabōdh* against almost all Marāṭhī grammarians.

Arthāpatti after all is a valid means of proof based on simple inference. We cannot explain the vigour of Devadatta who does not take his meals in the day, unless we infer that he must be having his dinners during night. Neither Mr. APTE nor his opponents cared to collect sufficient data but went on merely holding sides. Otherwise, in the full sense of Arthāpatti, they would have discovered some illuminating facts.

II. That the compound verbs came into being in the early NIA period is clear if we look into the history of NIA languages.

In his Doctorate thesis Dr. TULPULE observes : 'Āryabhāṣāṁcyā itihāsāt saṁyukta kriyāpadālā āraṁbha apabhraṁśānantar arvācīn bhāṣāṁcyā udayakāḷī jhālā asēc mhaṇāvē lāgtē' (Y.M.B. p. 255).

Looking to the scope of his thesis Dr. TULPULE might have been forced to this conclusion. But the statement appears to be a little dogmatic. He could have gathered fuller data to enable him to make such an assertion. A similar opinion with reference to verb-compounds in Hindi was already expressed by Dr. DHIRENDRA VARMA[12] who could not see any possibility of historical approach to the subject.

III. That this usage cannot be given any recognition until and unless

12. *Hindi Bhāṣā Vijñāna*, 1940, p. 307. Hindi Saṁyukta Kriyāōki racanā ādhunik hai; ataḥ is saṁbandha mē aitihāsik vivecan asaṁbhav hai.

a thorough search is made in other cognate languages for obtaining comprehensive data.

MOLESWORTH and BEAMES were suffering from this handicap. In fact they realised the necessity of further research in the line. In his *Tiñanta vicāra'* RAJWADE, while criticising DAMLE brings up the same issue. But instead of collecting factual data he attempts fanciful interpretations.

To begin with, in my Doctoral thesis I have collected a fairly exhaustive data from Marāṭhī, Gujarāti, Hindī, Avadhī, Bhojpurī, Oriā, Bengālī, Assāmese, Bihārī, Nepālī, Kāśmīri, Panjābī, Sindhī and Siṅhalese; there are countless examples of verbal composition. The statistics of auxiliaries giving birth to several morphological and semantic patterns of compounds runs thus:

M. 72, G. 63, H. 67, Av. 26, Bhoj. 15, O. 66, B. 24, Ass. 17, Bi. 18; N. 20; K. 23, P. 21, S. 23, and Si. 14. Out of these only a few may be cited *in extenso* for the sake of illustration.

1. √čuk- (M. only) or √cuk-, to mistake, err, blunder. Completives.

M. karūn-, to doff, finish doing. karūn, absol. < √kar to do.
kaḷūn-, to know fully (indirectly).

G. jaī-, to go away, have gone.
thaī-, to be over, have ended.

H. kar-, to doff.
jā-, to go away, have gone or reached.

Av. khāi-, to eat up, finish eating.
paṛhi-, to read out.

Bhoj. khāi-, to finish eating.
paḍh-, to finish reading.

B. kariyā-, to have done, doff, finish up.
khāiyā-, to eat up.

Bi. khā-, to eat up.
jā-, to have reached.

P. kar-, to finish,
khā-, to eat up.

S. kare-, to have done.

2. √jā- (M. only) or √jā, to go

(a) Completives and Intensives :

M. āṭūn-, to be dried up.
bolūn-, to have spoken, escape one's tongue.

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13. VALE, R.N. .... *Verbal Composition in Indo-Aryan*, Poona, 1948.

G. uṭhī–, to go away, walk out, to throw off restraints.
kaḷī–, to know fully, understand.

H. khā–, to eat up, swallow up, devour.
gir–, to fall off away or down.

Av. utari–, to descend completely.
mari–, to die away.

Bhoj. khai–, to eat up.

Oriya uṛi–, to fly away, disappear, run very quickly.
gheni–, to take away, remove, charm, lead.

B. caliyā–, to go away.
laiyā–, to take away, carry, carry off.

N. jāi–, to go off.
bhāgī–, to run right away.
(Instead of √jā– Kaśmiri has √gach–, to go.

K. karith–, to make and finish i.e. doff.
kheth–, to sit up.

P. bahi–, to sit down.
haṭ–, to stop, go back.
(Sindhi uses √vañ, to go, for the same purpose. So vaṭhī–, to take away or off).

Siṅ. uses ya (yanu or yanava) to go.
gena–yanu, to take away. (cf. Oriya)

(b) Continuatives, Intensive Continuatives and Progressives :

M. jhurat–, to go on emaciating.
lihīt–, to go on writing, practise writing.

G. khātū–, to go on eating.
bagaḍtū–, to go on rotting or wasting.

H. ātā–, to be coming usually, be in the habit of coming.
kahatā–, to go on speaking.

Av. mārai–, to go on beating, striking.

Bhoj. paḍhaī–, to go on reading.

B. deṭhiya–, to be rising.
deṛiyā or uṛiyā–, to be flying.

Bi. bahate–, to keep on flowing.
likh'te or likhait–, to go on writing.

(c) Passives :

M. pakadlā–, to be caught, arrested.
mārlā–, to be beaten, slain.

G. māryū–, to be absolutely defeated, lost, frustrated or ruined.
vahyū–, to be drawn after or along.

H. kahā–, to be said, told, spoken, commanded.
kāṭā–, to be hewn down, be cut off or down.

Av. chui–, to be touched, get touched.
chūṭī–, to be loosened.

O. kahā–, to be spoken.
taulā–, to be weighed in the scale.

B. khāoyā–, to be eaten.
mārā–, to be killed, get killed.

A. dekhā–, to be seen.
dhovā–, to be washed, get washed.

N. bagi–, to be swept right away.
bigri–, to be spoilt, be corrupted, be destroyed.

P. ho–, to be over, have happened.

Besides these the √jā– gives Purposives, Tentatvies, Adverbatives, Inceptives and Syntactives in different languages including Marāṭhī.

3. √jāṇ–, or √jāṇ–, to know.

Abilities :

M. karū–, to be able to do.
paçvū–, to be able to digest.

G. karī–, to be able to do.
lakhī–, to be able to write.

Bhoj. khāibe or khaibe–, to be able to eat.

S. kare–, to be able to do.
ḍei–, to be able to give.

More often it is found that people mistake √jāṇ for √jā. In older Marāṭhī poetry the use of √jāṇ– as an abilitive auxiliary is very common.

4. √de– or √di–, (K. only; S (di) to give.

(a) Permissives :

M. karū–, to allow to do.
jāū–, to allow to go.

G. āvvā–, to let come.
besvā–, to allow to sit.

H. khāne–, to allow to eat.
bolne–, to allow to speak.

Av. khāi–, to allow to eat.
likhi–, to allow to write.

Bhoj. āai, aibe, āibe–, to allow to come.
padhai–, paḍhbe–, to allow to read.

O. ḍekhā–, to allow a person to see you, grant an interview.
āsibāku–, to allow to come.

B. āsite–, to let come.
balite–, to allow to speak.

A. kariba–, to allow to do.

Bi. jāe–, to let go.
bole–, to let speak.

N. garnu or garna–, to let do.
jāna–, to let go, let be.

K. paknā–, to allow to go.

P. āṇe–, to let come.

(b) Intensives.

M. ṭākūn–, to throw away.
soḍūn–, to give up.

G. choḍī–, to give up.
pāī–, to drink down.

H. chuṭ–, to be loosened or delivered.
dho–, to wash out, cleanse.

Av. taji–, to give up.

Bhoj. phěk or phěke–, to throw away.

O. kahi–, to speak out, give out, divulge.
taṛī–, to drive away, scare away, expel.

B. uṛāiyā–, to squander away.
chāṛiyā–, to leave off, let go.

N. kāṭī–, to cut out, off.
beci–, to sell out.

K. karith–, to make out and out, accomplish.
gaṇḍith–, to tie up.

P. āṇ–, to bring.

S. uchlāe–, to throw away.

Then there are Adverbative, Desubstantive and Syntactive uses of this root which we have omitted here.

5. N. M. √bas–, G. √bes–, or H. √baiṭh–, to sit.

(a) Continuatives :

M. aikat–, to keep on hearing.
bolat–, to go on speaking.

H. de–, to go on giving.
mār–, to go on beating.

O. āgei–, to expect, keep on waiting.
dhari–, to harp upon, insist on.
Sin. uses √ind– or √hiñd–, to sit e.g. kapamin iñdimi, I am cutting.

(b) Completives and Intensives :

M. gamāvūn–, to lose for good.
nōdvūn–, to have enlisted.

G. khāī–, to eat up.
lakhī–, to write away, have written already.

H. uṭh–, to sit up, rise up at once.
kar–, to doff, have done with.

Av. kahi–, to speak up.

O. uṭhi–, to sit up, suddenly get up from bed.
uburī–, to kneel down, to undertake a thing, unasked.

B. uṭhiye–, to sit up suddenly.
khūiye–, to have lost.

N. uṭhi–, to stand up.
gheri–, to besiege.

K. uses √bih, to sit e.g. rāchi–, to guard carefully.

So also this root gives inceptives and syntactives in certain languages.

(6) lāg–, lagg–, lag–, to come in contact.

(a) Inceptives :

M. karū–, to begin to do, help to do.
mārū–, to begin to beat.

G. doḍvā–, to begin to run.
laḍvā–, to begin to fight.

H. āne–, to begin to come.
kahne–, to begin to say.

Av. āvai–, to set out, start coming.
Suni–, to begin to hear.

Bhoj. paṛhai or paṛhbe–, to begin to read.

O. karibāku–, to begin to do.

B. karite korte–, to set to do.
khāite khete–, to set to eat.

Bi. kahe–, to begin to say.
dekhai–, dekhanvai–, to begin to see.

N. pugna–, to begin to arrive, approach.

K. karani–, to begin to do.
kāpani–, to begin to tremble.

P. karṇe–, to begin to do.
pakāṇe–, to begin to cook.

S. karaṇa–, to begin to do.
cavaṇa–, to begin to say.

This root gives Compulsives in M. Assamese and K., Continuatives in H. O. and B. and Completives in N.

(7) √śak–, K. √hyak–, and S. √sagh–, to be able.

Abilitives.

M. kheḷū–, to be able to play.
laḍhū–, to be able to fight.

G. karī–, to be able to do.
joī–, to be able to see.

H. uṭh–, to be able to get up.
bik–, to be able to sell.

Av. uṛī–, to be able to fly.
chu–, to be able to touch.

Bhoj. paṛh–, paṛhai–, paṛhbe–, to be able to read.

Bi. jā–, to be able to go.
dauṛ–, to be able to run.

N. khāunu–, to be able to eat.
dinu–, to be able to give.

K. -anith, to be able to bring.
-karith, can do.

P. jā, to be able to go.
bac–, to be able to escape.

S. kare–, to be able to do.
māre–, to be able to strike.

These seven auxiliaries may be taken as representatives of the stock. A comparative study of these alone can prove how verbal composition is an essential feature of all NIA languages and how different languages tend to develop identical compounds with a similar form and meaning.

IV. That the compound verbs are a foreign plant: Neither Prākṛt nor Sanskṛt grammars take notice of them: There is no word for a verb-compound in Sanskṛt grammar.

This is the sum and substance of the view of the older grammarians as well as Messrs. Rajwade, Apte and Bhide.

A comparative etymological study of the auxiliaries referred to in the issue III was a help to me in discovering valuable material in MIA Prākrits and Pālī. In Prākrits I got 23 auxiliaries while in Pālī

I got 12 auxiliaries. Some of these deserve our close study before we proceed further. Thus *in Prākrits* we have :—

1. √acch–, (acchai) to sit.
   Continuative :
   (dhanasirī) tambolaṁ sabhāṇayantī acchai.
   (Dhaṇasirī) is chewing the beetle.

2. √jāṇa–, (jāṇai), to know.
   Abilitives :
   ṇacciuṁ jāṇanti, Gāthā 327, are able to dance.
   je pūiduṁ viāṇādi, Mṛcch. p. 78. Those who can worship.

3. √de (dei), to give.
   Permissives (negative) :
   (tassa guṇā) virahe ṇa denti mariuṁ, Gāthā, 327.
   (His qualities) do not let me die during the period of separation.
   Sehāliāṇā gandho ṇa sottum dei (does not allow to sleep) Gāthā.

4. mukka–, <Sk. mukta p.p.p. of √muc, abandoned, left.
   Completives :
   'Ko vi pavvaiyago, teṇa do vi jaṇā vi saṅkhaleūṇa mukkā (chained down) Utt. p. 256.
   ... veḍhiūṇa mukko (fastened completely), Utt. p. 47.

With this we may very well compare the modern Gujarāti auxiliary mu (–mū–) kvū, to forsake, put, place. This also gives completives or intensive completives.

For instance,
chodī–, to give up.
kāḍhī–, to drive out, dismiss.
veḍhī–, to fasten up, encompass completely.

5. √lagga, p.p.p. of √lag, to adhere (cf. Sk. lagna).
   Inceptives :
   laggo paribhāvium, Utt. p. 124 b. began to practise (self- culture).
   tato veraggeṇa niggao gehāo laggo puhaī hiṇḍium,

   Then having left home by reason of detachment he began to wander over the earth. Utt. p. 1106.

6. √sakk–, (sakkai), to be able, can.
   Abilitives (negative) :
   'eṣā lajjantī na kimpi tujjha sāhiuṁ sakkai', Utt. Bambh. 11.22.
   She is so ashamed that she cannot tell you anything.
   na sakkemi ... sarīraṁ dhāreuṁ, Utt. p. 285.

   I cannot hold my body.

In Pālī :

1. √gam, (gacchati), to go.

   Completives, Intensives :

   Sīhacammaṁ ādāya agaṁsu. J. 11.110

   They took the lion's skin away with them.

   aṭṭhi patitivā gataṁ, J. 3.26.

   The bone fell down (cf. M. hāḍa paḍūn gelē).

2. √tiṭṭha (tiṭṭhati), to stand, stand up.

   Continuatives :

   pharitvā aṭṭhāsi, J. 6.367, They kept on pervading.

   āyu usmaṁ paṭicca tiṭṭhati.

   usmā āyuṁ paṭicca tiṭṭhati, Majjhin. 1. 295.

   āyu depends on usmā and usmā depends on āyu.

3. √dā (dadāti), to give.

   Permissives (with infinitives) :

   khādituṁ-, to allow to eat. J. 1.223.

   nikkhamituṁ-, to permit to go out. J. 11.154.

4. √sakk (sakkoti, sakkati, sakkuṇāti), to be able.

   Abilitives :

   tārayetuṁ-, to be able to save.

   patikammam kātum sakkoti, is able to repair.

Encouraged with this material found in Prākṛts and Pālī I carried a further enquiry into classical as well as Vedic Sanskṛt. And to my surprise I could discover as many as 46 auxiliaries giving a number of verb-compounds. A few typical examples may be cited here :

1. √ās, (āste), to sit.

   Continuatives :

   uparudhya arim āsīta, he should continue blockading the foe.

   tāvac chavaṁ tatrāvalambyāste. Vet. 5.11. In the meantime the corpse continued to hang there.

2. √jñā, (jānāti, jānīte), to know

   Abilitives :

   kathāṁ kathayituṁ devi jānāmi. O queen, I am able to tell stories. (Som. Vr. K. p. 146,76).

   bandhum jānate, are able to tie up.

3. √dā (dadāti, datte), to give.

   Permissives (negative) :

   tāmeva na dadau gantuṁ. He did not allow her alone to go.

   bāṣpastu na dadātyenāṁ draṣṭuṁ, Śāk. VI.

   But the tears do not let her see.

4. √śak, to be able.

Abilitives :

kartuṁ śaknoti, is able to do
bhoktum śaknoti, is able to eat.

5. √sthā, to stand.

Continuatives :

hastena tasthāvavalamśya vāsaḥ, Raghu. VII. 9.
She kept on holding her garment in the hand.

āvṛtya panthānamajasya tasthau, Ragh. VII. 31.
(Princes) kept on blockading the path of Aja.

These and similar types in Sanskṛt clearly show the existence of verbal ocmposition in Old Indo-Aryan. The question why the Sanskṛt grammarians did not recognise them or name them will be answered later on. In the meanwhile let us revise the different forms of verbal composition which may be taken to represent the main trends in the career of Sanskṛt verb. The Sanskṛt verb, though highly synthetical in character was from time to time subjected to the processes of simplification with the sequel that it lost the rich store of its worn out forms of tenses and moods, the different nuances of which were no longer understood by the people. Of course, for every loss there was a compensatory gain. The development stopped through the channel of inflexion and began through the new channel of juxtaposition and composition. First there came into existence prepositional compounds. Then through the development of an auxiliary system there followed periphrastic compounds (Perfect and the First Future), along with a plethora of desubstantive compounds of 'cvī' type. In the epic period the full-fledged finite verb came to be superseded by participles in -at (-mana), -ta, -tavat and verbal nouns which in course of time satisfied their declensional needs by compounding with such colourless, auxiliaries as √as, √ās, √bhū, √vṛt and √sthā. The so-called category of compound tenses in new Indo-Aryan languages is nothing but a further development of these participial phrases or compounds. (cf. Bloch's *La phrase Nominale en Sanskṛt*, 1906). Along with these I would like to consider such constructions in which the finite verb is in the absolutive form and is gradually compounded with such auxiliaries as √sthā and √ās. This absolutival form of compounds has grown extremely popular in both MIA and in NIA stages although it was not recognised as such in those days. Next the modal terminations of a synthetical verb used to convey more senses than one which for the sake of intelligibility were first substituted by such devices as conditional, Benedictive, Desiderative, and frequentative but finding them too artificial and unwieldy were resubstituted by devising a class of auxiliaries like √śak √iṣ etc. supplying all those modulations

all right. These we may call the infinitive form of compounds as here the main verb is placed in the infinitive form.

To sum up, all forms of composition viz. (1) periphrastic, (2) participial, (3) absolutival, and (4) infinitival, that we find in abundance in the NIA languages have their forerunners in the literatures belonging to the OIA and MIA periods.

This is a triumph of historical linguistics which essays to interpret every phenomenon in language in its space-time context. Those who could not use these modern methods of historical linguistics were certainly working at a disadvantage. Otherwise we cannot account for the daring of Rajwade and others in advancing whatever interpretations occurred to them. Thus, periphrastic compounds like gantāsmaḥ and kathayaṁbabhūva must be split according to Rajwade as gantāraḥ smaḥ and kathay ām as the pre-Pāṇinian genitive termination as in utsādayāṁ akaḥ to be the object of babhūva. So also 'jāū dilẽ' mī jāū śaktõ etc. must be explained by translating in Sanskṛt as 'gantuṁ ayacchat' and 'mayā yātuḥ śakyate' a pre-Vedic voice, where jāū and gantuṁ or yātuḥ as verbal nouns in the relation of object (cf. K. Godbole who holds that gatum is the accusative and gatvā is the instrumental of the verbal noun gantu). Hence he concludes that inasmuch as every verb in Sanskṛt is an uncompounded simple and as every verb in Marāṭhī is analysable there is no necessity of recognising the category of compound verbs. He blames Damle for his ignorance of Sanskṛt grammar and want of analytical intelligence. All the same it may be pointed out here that a group of words like jāū dilē or gantāsmaḥ which is a semanto-phonetic unit of our speech cannot be explained by a mere paraphrase. Mr. Rajwade should have taken into account semantic aspect as well. Even according to Pāṇini the form gantāsmaḥ' is a genuine form and is a compound.

V. That the idioms and syntactic groups like prīti karaṇẽ, parīkṣā karaṇẽ, viśvās dharaṇẽ, aṅgāt ghālaṇẽ etc. cannot be admitted as compounds.

Revd. Navalkar, Kher and Joshi recognise these as nomino-verbal compounds. But Damle points out that they are not recognised as such even in English. If we accept these we will have to accept thousands such. In analysis we may call them together as predicate but in grammar we must treat them as objects. Cases like saṁpādan karaṇẽ must be looked upon as exceptions as Dadoba has done. Mr. Kellogg in his Grammar of Hindi gives an exhaustive list of such examples but he also is doubtful about their compositional character.

All such examples without exception should be grouped under desubstantive — or syntactive — compounds referred to above. For they are periphrases or idioms. This process of splitting a verb into a noun

and an auxiliary started very early in OIA and today our language cannot express a single idea in a simple verb. We prefer parīkṣā karṇē to parīkṣaṇē, whereas we have no corresponding verb for 'to love' as √prī (sk.) or √kam (sk.) in Marāṭhī, so we use prīti karṇē. In Sanskṛt, we have,

(i) with a noun in the accusative ·

pūjāṁ karoti, a periphrastic form for pūjayati, worships.
manaḥ karoti, attends (an idiom).

(ii) with a noun in the instrumental :

manasā-, does whole-heartedly.

(iii) with a noun in the locative :

agnau karoti, to make an offering into fire. pāṇau karoti, to take by the hand, marry. (cf. guhākaḥ (RV. 4.18). śirasi dhā etc.).

Aṅgāt ghālṇē etc. may be looked upon as idioms and grouped under syntactive compounds, for they too have a unity of sense. In Sanskṛt, phrases like 'pāṇau gṛṇhāti' lead to compounds like pāṇī-grahaṇa.

VI. That the compound verbs are merely a matter of syntax.

J. S. SPEIJER, in his *Sanskṛt (classical) Syntax* (1886) states in art. 384 : 'Sanskṛt infinitive, like ours, acts in some degree as a complement to the main predicate. But in his later work Vedische und Sanskṛt Syntax (1895) he recognises √śak, √arh, √iṣ and such other verbs of cans, wills, gets and the like to be the *hülfs — verba* or helping verbs. All the same he looks upon them as in English as auxiliaries of incomplete predication and looks down upon the infinitive as a mere complement. Likewise many of our Marāṭhī grammarians like RAJWADE hold that the inflected finite verb is the only verb and the non-finite verb is an object or a complement.

However, in this connection Pāṇnini's sūtra: 'śakadhṛṣa-jñā- glā-ghaṭa-rabha-labha- krama- sah- ārhāstyartheṣu tumun (P. 3.4.65) is very valuable. Pāṇini gives a list of auxiliaries which is capable of extension on the principle of analogy. He uses the term upapada for an auxiliary in order to express its subordinate function to the main verb in the non-finite form called a dhātu. In order to emphasize this relation of principal and subordinate, Bhaṭṭoji in his *Kaumudi,* writes these constructions in the form śaknoti bhoktum, perverting their natural order. Thus for example, in 'mī jāū' śaktō, śaktō is not to be looked upon as the main verb merely because it is inflected. śaktō is after all an upapada while jāū is the mukhyapada or main verb. In this context it may be borne in mind that we cannot brush aside these constructions as mere cases of syntax in which one verb is governed by the other in infinitive mood as is done by

L. MURRAY, D. FORBES, KELLOGG, BEAMES, HOERNLE and many others. For, a compound whether nominal or verbal is nevertheless a syntactical fragment of a sentence in which there obtains a relation of principal and subordinate between its immediate constituents as one governed by the other, but if taken together the constituents possess sāmarthya or the semantic unity which is the hall-mark of composition. One Sanskṛt grammarian, the author of Vyākaraṇa-Siddhānta-Sudhānidhi, endeavours to give an analysis of all auxiliaries in the sūtra and notes in his own way certain shades of action suggested by them, while Albert HOFER in his '*Infinitive besonders im Sankṛt*' (1840) actually registers several cases of composition in which an infinitive is compounded with an auxiliary for indicating a certain aspect.

VII. That the verb which is analysable cannot be called a compound: The members of the compound cannot be written separately.

The artificial and forced analysis of a verb as proposed by RAJWADE is already dealt with in issue No. 4. As regards the other half of the issue it is the standing contention of Mr. Apte that if 'jevū̃ lāglā' is a compound it must be written as one word. We do not write it. Therefore there are no compound verbs in Marāṭhī.

To this Mr. MONE replies that outwardly there may be two words but if they together function as one verb in a sentence they should be admitted as compounds.

What is the real test of a compound? The author of *Sārasvata Vyākaraṇa* declares that a compound must possess threefold unity viz. accentual unity, inflexional unity and morphological unity. But facts plead against it. All syntactical compounds like bṛhaspati — lord of prayer — violate the accentual unity. Against the inflexional unity the whole class of aluk compounds is a concrete evidence e.g. dāsyāḥ putraḥ; sītāyaḥ patiḥ, caurasya kulam etc. Next, the cases in which the morphological unity is disregarded are again plentiful e.g. śunaś cic chepam for śunaḥ śepam (R. V. 5.2.7) 'vidām va idam ayaṁ cakāra' in which there is 'vidāṁcakāra (J. B.), or 'prabhraṁśayāṁ yo nahuṣam cakāra' for prabhraṁ-śayāṁ-cakāra (Raghu. 2.13). Thus it is clear that mere convention of writing the members of a compound together is not the true test of composition. The form may be completely split up and still it is a bound form like Sītāyāḥ patiḥ (cf. Sītāyaḥ pataye namaḥ).

In this connection, we may study the famous canon of composition laid by Pāṇini in his sūtra 'samarthaḥ Padavidhiḥ' (p. 2.1.1) which says that a samāsa as a rule, is a combination of words giving rise to a unity of sense. This criterion of semantic unity[14] between the immediate con-

14. A separate paper on *sāmarthya* = *ekāthībhāva* or 'semantic unity' is under way.

stituents of a compound holds good both for a nominal compound as well as a verbal compound. Hence the semanto-phonetic units like karū√de and khāūn√ṭāk need not break their composite form even after an insertion of a word like 'ca', or 'tar' between them.

In passing it may be pointed out that the form 'jātāsi (Uddh. 113) referred to by Dr. TULPULE as a typical verb-compound on the basis of morphological unity could be a sandhi alternant like 'gelate' for 'gele hote'. Nevertheless, its compositional character endures.

VIII. That the voices in Marāṭhi will be better explained if we disown this category of compound verbs.

In his *Marāṭhi Grammar,* art. 336-337 KRISHNASHASTRI GODBOLE urges how √de, √pāḥ, √śak, √jā etc. cannot be accepted as compounding auxiliaries as there are voice-difficulties. Mr. JOSHI could not get over them; even Mr. KHER was beugiled by them. So Messrs. APTE and BHIDE straightway discarded the verb-compounds altogether as they have nothing but only nuisance value, according to them.

To this we reply that composition may leave its mark somewhere. In the sentence 'tyānẽ malā jaū dilẽ', 'jaū dilẽ' is a verb-compound, only that the original intransitive root 'jā' became transitive as a result of composition. It has nothing to do with the change of voice; for, even in the active voice the expression jaū deto in the sentence 'to malā jaū deto' is a compound expression. DAMLE takes another example: 'tyānẽ malā pothī vācū dilī and triumphs over GODBOLE, JOSHI, KHER and others in showing how vācū is an indeclinable — for in 'tyānẽ malā pothyā vacū dilyā' the infinitive vācū is unchanged — and not a verbal noun in the accusative. Anyway, pothyā is the direct object of the compound expression vācū dilyā. The insistence of BHIDE in calling āhe alone as a principal verb in the sentence 'tyānī pustak dilẽ āhe' dilẽ is the adjective of the 'pustaka' is already explained under participial composition in Sanskṛt (cf. issue IV) and a little later by fixing the character of a dhātu and an upapada (vide issue VI).

In this connection we may note how an intransitive root becomes transitive by force of composition as in the case of prepositional compounds (cf. akarmakā api vai sopasargāḥ sakarmakā bhavanti) in Sanskṛt such as adhi + √śī, √sthā or √ās.

IX. That in grammar we are more concerned with form and not the meaning.

In his *'Marāṭhicē Antaraṅgadarśan'* Mr. G. K. MODAK challenges the claim of √ṭāk, √lāg, √ye, √de etc. to the title of compounding auxiliaries on the ground that they develop a secondary sense. According to him the scope of grammar does not reach beyond the form (rūpa) of a

word and he does not wish grammar to be transformed into poetics by dealing with meaning. Evidently as in English he recognizes only five auxiliaries √as, √nas, √jā, nako and √naye as supplying tense, mood and voice to the other word which is a sense part. He points out that even in English there is no sense-auxiliary as such. Thus there are no compound-verbs in Marāṭhī, save some juxtapositions (or joḍ-kriyāpadē) given by those five auxiliaries.

Principal AGARKAR long before Mr. MODAK stressed the arthānugāmitva of grammar. Indeed we use compounds or more words to clarify our ideas which are antecedent to them. And we compose verbs in order to give expression to a composite idea. Mr. MONE in his *'Marāṭhī Vyākaraṇakāra āṇi Prabandhakāra'* (Poona, 1927) remarks, 'If the grammar does not take into account the aim or the meaning of the speaker then what is the use of it?' The remark was intended towards Mr. MODAK but he was not ready to give up his position. So this point requires further elucidation.

A compound is the topic of grammar. It is felt to be a single word-organism, generally constituted of two separately intelligible words. The resulting sense of a compound, as a whole, is more or less different from the precise etymological values of its immediate constituents. Pāṇini in his sūtra 'samarthaḥ padavidhiḥ, states the same thing. For the attainment of semantic unity (sāmarthya), every member of the compound has to brush off a part of its sense which is inconsistent with the whole. This means that we resort to jahadajahallakṣaṇā here (cf. Patañjali 2.329 'jahadapyasau svārthaṁ nātyantāya jahāti, yaḥ parārthavirodhī svarthastam jahāti). A compound does indicate a kind of evolution of sense. And *ipso facto* grammar has to deal with sense. Grammar cannot afford to leave sense and to deal with mere non-sensical bones. May I remind Mr. MODAK of the famous canon of Patañjali — arthagatyarthaḥ śabdaprayogaḥ arthaṁ saṁpratyāyayiṣyāmīti śabdaḥ prayujyate MBh. Vol. III, p. 15. The form and the meaning are organically connected with each other — 'vāgarthāviva saṁpṛktau' as Kālidāsa would express it or nityo hyarthavatāmarthairabhi-saṁbandhaḥ MBh. Vol. I, p. 7, as Patañjali would state it. There is no dispute amongst Vaiyākaraṇas and Ālaṁkārikas as regards abhidhā and lakṣaṇā and even as regards vyañjanā grammarians like Nāgeśa have no objection. Patañjali has clearly shown under the rule P. 4.1.48 the four different circumstances under which lakṣaṇā is usually resorted to.

The auxiliary system in English is much wider in scope. It includes, auxiliaries of periphrasis, of tense, of moods, of voice, and of incomplete predication. (Vide N. E. D. MURRAY). It includes also the auxiliaries which indicate the manner of action of another verb (MORRIS and BOWEN — 1878 quoted in N. E. D. by MURRAY). Even in Sanskṛt

the auxiliary system sanctioned by Pāṇini in his sūtra 'śaka ḍhṛṣ.... etc.' includes not only the *astyartha* roots but also those meaning 'cans' 'wills' etc. Hence it is not necessary for Mr. MODAK to restrict the number of auxiliaries to five colourless roots. It is true that the role of an auxiliary is apparently a subordinate role. It is also true that at times in composition one of the components becomes functionally so subordinated to the other that it takes on the character of a grammatical element — as SAPIR would put it, A + B A + b A + (b). But it is not true that all auxiliaries should necessarily give up all their meanings and become zero elements in composition; at the most they may drop out that sense which is inconsistent with that of the main verb. And this naturally leads to individual variation in degrees. To be sure, every auxiliary has a different sense, a different history and a different function to perform. From this viewpoint it is worthwhile to study the case of √śak, to be able, which though quite independent in the early OIA, gradually dwindled into a mere auxiliary in the late OIA stage itself and continued its career as an auxiliary throughout the MIA and NIA stages.

In the earlier portions of the R. V. we find,

'sa śakra uta naḥ śakat' — RV. I.10.6.

'That God Indra, indeed, rules us'.

'agne śakema te vayam' — RV. 3.27.3.

'O Agni (if) we are competent for you'.

But in the Xth Maṇḍala, for the first time we notice its usage as an auxiliary.

'ā devānāmapi panthāmaganma yacchaknavāma tadanu pravoḷhum (RV 10.2.3), we have followed the very path of Gods in order *to be able to accomplish* whatever we could.

In the AV yaścakāra na śaśāka kartum ......

He tried (lit. did) but could not do (AV. 4.18.6)

tamudyantuṁ nāśaknot (Ait. Br. 1.2)

He could not lift it.

And so on. The other uses in OIA, MIA, NIA have been already mentioned above. The auxiliaries like √kṛ can be used as independent verbs even now but √śak has lost that status long ago. However its sense viz. to be able, is retained intact even in composition. And the main verbs with which it is compounded, convey, in the end, the aspect of ability.

X. That this usage is very much restricted in English or Sanskṛt, whereas some Marāṭhī grammars give it an unrestricted recognition.

A part of this issue is discussed in the issue No. IX. In the main, this issue is directed towards Rd. NAVALKAR, KHER and AGARKAR who give their whole-hearted support to Verbal Composition in Marāṭhī.

At the outset it may be pointed out that the usage of verb-compounds is not a dead usage. It is growing all the while, and we cannot put an end to its growth when linguists like GRAFF assert that there is no end to the types of compositions, why speak of compounds. Even the number 500 visualized by DAMLE is very arbitrary. Moreover, when we recognise a category and make a rule for it we cannot debar any legitimate type. I have already noticed sixteen broad classes[15] of these compounds and am ready to register if I find a new one. They are — (1) Abilities, (2) Acquisitives, (3) Adverbatives, (4) Causatives, (5) Completives, (6) Compulsives, (7) Continuatives and Progressives, (8) Desideratives and Purposives, (9) Desubstantives and Syntactives, (10) Inceptives, (11) Intensives, (12) Negatives and Prohibitives, (13) Passives, (14) Permissives, (15) Probabilities, and (16) Tentatives. Each one of these classes has a group of auxiliaries that gives rise to different morphological patterns of compounds. So in matters of living linguistics any arbitrary restriction is unnatural.

It is a popular belief that there is only nominal composition in Sanskṛt. But it is not true. Patañjali as well as the author of Kāśikā while commenting upon the sūtra 'saha supā (P. A. 2.1.4) boldly recognise verbal composition side by side with the nominal one by the device of Yogavibhāga or the principle of division in the sūtra — yoga = sūtra). It is the later commentators like Kaiyaṭa who intentionally attempt to limit the sphere of verb-compounds to a chosen few. (cf. Pat. M.B. 2.358 Pradīpa: 'yogavibhāgaśca iṣṭaprasidyartha iti sarvatra samāso na bhavati . . . yogavibhāgaḥ katipayatiṅantaviṣaya eva). Naturally verbal composition came to be neglected and more attention was paid to nominal composition and its classification. Pāṇini, Patañjali and the author of Kāśikā had left a clue but no one looked to it save Bhaṭṭoji who in his Śabdakaustubha, Karikās and Kaumudī made a capital out of it and reset the whole scheme of composition on a broader basis. According to this scheme we have (i) noun + noun e.g. rājapuruṣaḥ (ii) noun + verb e.g. paryabhūṣat (iii) noun + verbal noun e.g. kumbhakāraḥ (iv) noun + root e.g. kaṭaprūḥ (v) verb + verb e.g. pibatakhādatā (vi) verb + noun e.g. astikṣīrā (gauḥ), in all six classes. It is surprising, however, to note that Bhaṭṭoji has grouped them as irregular types. Besides a pure verb-compound must function as a verb in a sentence. That is, the final member[16] of such a compound at any rate must be a finite verb. This condition, nevertheless, is not fulfilled by any class save the second. As

15. In *Britannica Encyclopaedia*, XIth Edition, under philology, it is observed that 'there is no clear terminology as regards the stages of action in verbs e.g., perfective (terminative), and durative, iterative etc.' Hence, a clearer terminology has been suggested hitherto.

16. Negative compounds at times retain the negative particle at the end as in Marāṭhī: karī-nā etc.

regards verbal composition Bhaṭṭoji also appears to be equally conservative.

In the circumstances can we find out why great grammarians like Pāṇini did not call any of the verb-compounds treated so far as *Kriyāsamāsas* in clear terms. As a matter of fact the criterion of semantic unity holds good here also. Pāṇini would also endorse it. But there was one scientific difficulty. Pāṇini based his major terminology viz. dhātu, prātipadika and pratyaya on the great Vedic tradition. That is why he was constrained to define the Prātipadīka as different from dhātu and pratyaya. Patañjali too steps in his shoes when he remarks that the will of Pāṇini does not indicate that a dhātu should be called a prātipadīka. Patañjali therefore declares that if a group of significant words is to be called a prātipadika it should apply to samāsa and to nothing else. But when asked whose samāsa ? he answers that samāsa of nouns only. Then while explaining upapada compounds he himself is not able to maintain this position. However he allows to that extent the accepted combination of significant nouns and verbs or verbs and verbs, to be admitted to the province of prātipadika. Now the case of such combinations as 'bhoktum, śaknoti', 'kartuṁ icchati' etc. is slightly different. Without doubt, Pāṇini clearly recognises √śak √iṣ etc. as auxiliaries subserving the main verb in the infinitival form. But in this case the upapada e.g. śaknoti is a finite verb, contrary to the sūtra *upapadamatiṅ* which stresses the non-verbal function of an upapada. Secondly although √śak, √iṣ and the like do not function as dhātus according to Pāṇini, still, in fact they are one and all dhātus. Thirdly we would not call them prātipadikas as Pāṇini himself has differentiated a prātipadika from the tiṅ under the sūtra *Kṛdatiṅ* leading to 'atiṅ prātipadikam'. In view of these difficulties it was not possible to bring these types under the upapada compounds even for a Patañjali. However had he shown courage to recognise tiṅantas to be a new vṛtti it would have been pretty easy to name these as tiṅsamāsas or KRIYASAMASAS, the first member of which is the principal member governing the second. The commentators of Patañjali are aware of this loophole but cannot help harping on the same strain and adding that tiṅanta can never be a vṛtti as the author of the Bhāṣya does not recognise semantic unity in relation to tiṅs (cf. tattvabodhini on vṛtti, Kau. Ch. 22, Lahore Edition 2.215 'ata eva tiṅantaṁ vṛttirna bhavati, tatraikārthībhāvānabhyupagamāt). Thus it is clear that ultimately Pāṇini's traditional postulates of the prātipadika etc. are responsible for the non-recognition of these compounds. It is also possible that in Pāṇini's times the potentialities of these types although pronounced were not realised as they are today. Anyway it is not wise to shut our minds against such genuine usages, like Pāṇini's commentators, only on the grounds of tradition.

IX. That because we are required to postulate the category of compound tenses we cannot help postulating verb-compounds as well.

In his comparative grammar of the Indo-Aryan (Vol. III, p. 215, art. 71) Beames asserts, "By using the expression 'compound tense' in a wider sense than that in which it has been employed in the former part of this chapter, we may legitimately include under it that large and varied class of phrases in which two verbal stems are used together to express one idea." Prof. K. P. KULKARNI almost repeats Mr. BEAMES and points out how the recognition of compound tenses is a sufficient cause for the recognition of compound verbs. Dr. TULPULE merely refers to this view of Prof. KULKARNI in his thesis.

But, would they hear DAMLE who points out how compound verbs and compound tenses are not invariable concomitants ? Indeed compound tenses as pointed out above are nothing but one phase of the general process of verbal composition and not vice-versa. Compound tenses cannot have any wider sense as the term is less inclusive. Again by composition we mean several stages of action and not those of tense which is a homogeneous and uniform category. The word compound is wrongly superimposed upon the tense rendering the term 'compound tense' quite a misnomer. That way the category of compound tenses is a superfluous category. At any rate it cannot have any independent status.

XII. That auxiliaries may be divided into significant and non-significant.

DAMLE felt the difficulty in determining the main semanteme of a verb-compound. So he proposed this division of auxiliaries into significant and non-significant auxiliaries in relation to their function in composition. Prof. G. H. KELKAR criticises this proposal of DAMLE suggesting that non-significant auxiliaries are not auxiliaries at all. He means to say that non-significant auxiliaries are practically devoted to bringing out several tenses and moods. They are subsidiaries and (give rise to complex verbs), whereas significant auxiliaries are independent and give rise to compound verbs. According to Beames, Kher and others however the term auxiliary should be restricted to the colourless roots supplying tenses and moods and the significant roots should be designated as ancillaries or serviles. Apart from the question of terminology shall we differentiate between auxiliaries and auxiliaries as those that give rise to compound verbs and those that do not ?

This last question we should like to take up first. From our discussion in previous issues it follows that a finite verb is called an auxiliary only when it forms the second member of a verb-compound supplying different stages and aspects of action to the main verb in the non-finite form. Moreover, we have established that compound tenses are but one phase of this verbal composition at large. Obviously then it is unnecessary to distinguish between the degrees of significance of one auxiliary and the other. One and all auxiliaries form compounds and a member

of a compound may shed a part, full or none of its meaning in adjusting with the other member for producing semantic unity (vide the case of √śak dealt with in IX above).

XIII. That there is an amount of difficulty in parsing these verb-compounds.

Mr. KHER observes that there are no fixed rules for parsing. When a compound verb together expresses one complete idea it should be parsed as one verb. Leaving his jumble about significant and non-significant auxiliaries DAMLE agrees with Mr. KHER. However his suggestion of recognising one root, two roots or a joint root is anything but satisfactory. For everywhere we must single out a compound verb as one syntactical fragment of a sentence.

For instance, in the sentence 'āmhi Patwardhan Sāhitya Mandir bāndhũn cukalõ mhaṇaje kāhĩ cũk keli nāhĩ' 'That we have (completed building or) built up the Patwardhan Sāhitya Mandir is not an error committed by us'. In this sentence the word Patwardhan Sāhitya Mandir is not related to the finite verb cukalõ direct (lit. we missed Patwardhan Sāhitya°) nor to the subject 'āmhī. Again āmhī Patwardhan Sāhitya Mandir bāndhũn is incomplete even as a sentence. So the relation of āmhī and Patwardhan Sāhitya Mandir must be presumed with the compound expression 'bāndhũn cukalõ' which contains a semantic unity. The auxiliary cukanẽ has lost its primary sense (to err, mistake, blunder) in composition and it now helps to complete the notion of the main semanteme bāndhũn in the non-finite form. Words in a compound have no relation individually with other words in a sentence (cf. samāse vyapekṣā nāsti). Naturally the association of one kriyā with the other in order to yield one indivisible concept (of complete building) has got to be recognised as a genuine verbal compound. Hence bāndhũn cukalõ is a verb compound of √bādh + √cuk in the past tense, first person, plural, having āmhī as its subject. Here √cuk not only supplies the declensional needs of the main semanteme √bādh, but also completes the action in question. No wonder that it is called a completive auxiliary and the class of compounds is a completive class of compounds with the main semanteme in an absolutive form.

This brings us to the end of our discussion. All these thirteen issues viewed together would reveal how verbal composition is a vital topic of Indo-Aryan linguistics, and how the arguments raised by many learned scholars seem to be more often than not unfounded or ill-founded. Nominal composition has fossilized long ago but verbal composition is growing apace. For instance, Causatives in NIA languages are being manufactured in several languages today : G. Av. EH. B. A. Bi. K. P. and S. have not possibly developed a causative auxiliary as yet; in this

respect Marāṭhī has gone beyond the experimental stage since it has as many as four causative auxiliaries viz. √ghāl, √ghe, √lāg, and √lāv. Moreover, it is not impossible to bring more and more new auxiliaries in order to express new types of composite ideas.

There is a prevalent notion among scholars that verbal composition is borrowed from Dravidian languages. Dr. S. K. CHATTERJI makes an observation that "in this point there is remarkable agreement with Dravidian. In the Dravidian languages compound verbs of exactly similar formation and function occur. It is very likely that here we have another contribution of Dravidian in the formation of modern Indo-Aryan speeches". This observation of S. K. CHATTERJI is critically examined in my thesis. A thorough investigation was made in Tamil, Malayalam, Kannaḍa, Telugu and Tuḷu, 199 entries of auxiliaries were registered and on an analysis of the data it was found out that there are chiefly three types of composition in Dravidian.

(i) Desubstantives or the Kriyāsamāsa proper of the Dravidian grammarians e.g.

1. kampi nīṭṭu, (Tamil), to run away < kampi, n., wire nittu, to lengthen.
2. abhiṣekaṁ ceyuka, Mal., to give a ceremonial bath. agglu.

(ii) Root agglutinations or Dhātupallavas e.g. potar (u) or pota, K., to fetch (thus potandam fetched. < pogu, to go ÷ tandu past and √tā, to bring), and

(iii) a non-finite verb compounded with a finite auxiliary.

These appear to be the result of back-formation at a later stage like housekeeper < to *housekeep and meat-eater or meat-eating < *meat-eat e.g. toṭṭu kuli (Mal.) pollution by touching a low-caste man', and kuti-k-kālca (Mal.), an interview between two parties like kings or Gods, which have no corresponding verbal form in the language.

Thus it is established that the evolution of verbal composition in Indo-Aryan is an independent development from early OIA onwards. Dr. CHATTERJI'S view needs a revision. Even Dr. DHIRENDRA VARMA is of opinion that there is hardly any influence of Dravidian languages here. To quote his very words — 'saṁyukta kriyā drāviḍa bhāṣāõ mē bhī pracalit hai kintu unakā Hindi par prabhāv paḍanā kaṭhin mālūm paḍtā hai'.

Towards the close I would like to make one general observation on the basis of my experience in studying this problem. It is noteworthy that many of our master-minds right from the days of Pāṇini down to our times are too much authority-ridden and lack an independent approach to new problems. They sensed the necessity of making tiṅanta a vṛtti but they could not break away from the established tradition. Naturally

the development of grammar as a science stopped in India long ago. Even moderns like Rajwade and others wanted the sanction of Pāṇini and Patañjali, when they could have collected independent data using the same methodology of those old veterans. Similar is the case with other Śāstras. So I wish to press home upon all students of Sanskṛt and other Indo-Aryan languages the dire necessity of absolving ourselves soon from the authority-ridden, inert orthodox minds by creating a new school of research which will aim at bringing every Indian Śāstra up-to-date removing all causes of stagnation.

APPENDIX

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BOOK REVIEWS

The Indian Family in Transition: A case study of Kerala Syrian Christians: by George Kurian, published by the Institute of Social Studies, The Hague, 1962.

In this book Mr. GEORGE KURIAN examines how far the Indian family is sensitive to social forces and what are those forces. For this purpose, he selects the Syrian Christian community of Kerala for an intensive study. In order to identify as many factors of change as possible, first of all an educated group of Syrian Christians from Kerala is selected, to assess the influence of education, and then another group is selected from Bombay city to assess the influence of urbanization, in changing the structure of the family.

The author starts his work with a consideration of the general problem of change, with particular reference to family change, and makes a brief statement of the problem. Next he takes us to the field of his study, viz. Kerala and gives an ecological and historical sketch of the community under study. Kerala is a separate cultural entity. This is the most densely populated part of India with the highest percentage of literacy. Here the Syrian Christians and Hindus live side by side, and the former have adapted to the Hindu pattern and adopted many of the Hindu customs so much so that they (Syrian Christians) have become a more or less endogamous caste.

Mr. KURIAN then gives a detailed account of his field of investigation from which data were collected by questionnaire method. His respondents come from all the main Syrian Christian denominations viz. Roman Catholics, Jacobites and Marthomites, and constitute the upper middle class, who, according to the author, form the "progressive element within the rural area". He selects a second group from a highly industrialized urban area, viz. Bombay. He analyses the changes taking place within the family with reference to (1) the type of family; (2) marriage; (3) dowry; (4) disagreement with wife; (5) family planning; (6) leisure-time activity; (7) freedom of women; and (9) authority over children. He found that in all these sectors change is taking place. Thus the nuclear family is the preferred form of habitation. Marriages are becoming less and less the sole arrangement of parents, but are either arranged by the parents with the consent of the parties, or by the parties with the consent of the parents. Coming to dowry, it is found that though the practice is deeply entrenched into the custom, still in the urban

area, there is a higher proportion of those who do not accept dowry, showing thereby that in this sector also education and urbanization affect the family. Both rural and urban respondents are favourably inclined toward family planning. But here also there is difference of opinion as to the means for its realization, majority of the former favouring 'abstinence' and the latter favouring 'artificial means', showing thereby the deeper influence of urban forces. Change is also discernible in the attitude toward religion. The two groups also deviate from the conventional pattern with regard to the attitude towards women, but the urban group is more liberal than the rural group. This shows that the family of educated upper middle class is undergoing change in the rural setting, and the major force here is identified with education. But the fact that the progressive group from Bombay has changed more means that factors other than education are also at work, and the author identifies urbanization as a major factor.

But what evidence is there that all these changes are not peculiar to the Syrian Christians, but have got all-India validity? For this purpose, the author brings evidence from the study of Indians settled abroad. Neither the Indians settled in Uganda nor those settled in Surinam have got the joint family system. Further, he quotes from the study of Dr. SAHIAR and that of Dr. V. RAO to corroborate his thesis and proves more or less successfully that Indian family is sensitive to social forces and is on the process of change consequent to forces unleasehed by education, industrialization, urbanization etc.

However, one criticism may be made. In the study of the rural group, the author says that there is change. For this purpose, he assumes the traditional pattern as this and that, giving much scope for subjective elements to enter into. Instead he could have classified his respondents generationwise and seen how much one generation had changed from the previous. This would have made the point of departure quite objective and lucid.

K. C. ALEXANDER.

The Deccan Forts : A study in the Art of Fortification in Medieval India. by J. N. KAMALAPUR, Popular Book Depot, Bombay 1961, Rs. 8 = 75.

The Indian continent abounds in the ruins of defensive works of the past ages. The work under review is an attempt at an examination and evaluation of medieval fortifications of a particular region, viz., the Deccan. In the words of Prof. KENI who has written the Foreword, "This essay presents a brief but lucid account of some of the important forts of the Deccan. It fulfils a special need in making available much

information on the forts surveyed in a handy volume, useful to the tourists, the students of history and the general readers". The book resolves itself into two main parts. In the first, entitled Introduction, the author has presented a short political history of the region and has stressed the historical, sociological and geological factors that led to the growth of such a large number of forts in the Deccan. A brief glimpse into the antiquity of fortifications in ancient India has also been afforded here. The other part, which forms the main body of the work, describes, classifies and discusses the main features and the history of some of the important forts. A number of maps and sketches go in to illustrate the argument. The Bibliography attached at the end would give a student good guidance for detailed reading on the subject.

Indeed a handy volume containing information regarding the military architecture of the area was long overdue and Shri KAMALAPUR's effort is most welcome on that count. Most of the known information was scattered over old works like the *District Gazetteers*, the *Annual Reports* of the various Archaeological Surveys and some Marathi books. All these were not very easily accessible to the common man. This short and popular version would serve his needs well.

If however, the book is supposed to be of use to a student of history, the study would fall short of this expectation in certain very important respects. Opinions expressed regarding the sociological background of the Maratha power or the activities of the Marathas in the tectonic field are less than fair and are based on out of date theories and propositions. Then again when it comes to matters scientific, the delimitation of the region to be surveyed seems to be rather arbitrary and the reasons the author has advanced in its support are not convincing. It is a well known fact that kingdoms like Ahmednagar, Bidar, Bijapur have at various periods of history followed widely divergent and often conflicting political courses and this diversity has affected their military architecture greatly. The author seems to have ignored the implications of this fact. This has led to the selection of forts without any logic behind it. For example, on which border do the four forts put under the category of 'Border Forts' stand ?

The most vital part of the study is the one that represents the author's analysis of the important features of the forts and their classifications. The selection of a particular spot for the construction of a fort or a military stronghold is a matter of primary importance. The author dismisses the whole idea with : "The sites were generally well selected on some difficult and inaccessible hill-tops". The spots had to have many other virtues for being chosen as sites for forts in addition to being difficult and inaccessible hill-tops. Geography was a factor at least as important as geology. The strongholds were so located as to protect either

some important trade or military route or some pass, or some town. Instances of each of these abound in the Maratha forts. While Simhagad and Purandhar stand sentinels over the approaches to Poona, the fort Jivadhan guards the Nana Pass while Ankai-Tankai takes care of the Ahmednagar-Manmad route. The Azam Tara affords protection to Satara while Govalkot guards Chiplun. It is important to note that most of the sea forts built by Shivaji guarded some harbours or estuaries. Nor has the inaccessibility of which the author already has spoken, been taken into consideration while judging the merits of individual strongholds. The most notable example of this omission is the Bijapur fort. It is located in a depression of land and COUSENS remarks : 'It is difficult to conceive why such a position was ever selected for a city that had to defend itself against many enemies. There is nothing whatever in the natural features of the ground to give it any claim to preference; rather the reverse. ..... The whole eastern and northern quarters are completely overlooked and commanded by higher ground on these sides which surrounds and is close up to the walls. A few batteries entrenched along these ridges would, in a short time have laid the city in ruins.' Aurangzeb used the same method to bring the fort down. The author refers to pairs of forts but fails to appreciate their significance as far as location is concerned.

The classification of forts into land, sea and hill forts is universal. But one wonders how Shaniwar Wada at Poona could be classified as a fort. It is to be remembered that land forts are to be distinguished from fortified towns and both from castles and gadhis. At Bidar for example, one finds both, a land fort and also a fortified town. Instances of gadhis or castles are numerous, Shaniwarwada being one of them. These shortcomings have reduced the value of an otherwise painstaking effort. It might not be out of place to suggest that had the author consulted the masterly work of Ramachandra Amatya viz., '*Ajnyapatre*', in which the wisdom of medieval military engineering is precisely narrated, most of these defects could have been avoided.

M. S. MATE.

[BDCRI]

Bulletin of the Deccan College Research Institute.

Number 22

INDEX

From this issue *a newer type of Index* is being introduced. It gives the author-name, title of the article, number and page of the *BDCRI* and a short summary of the article by the author himself. These could be cut and pasted on regular size reference Index cards.

Mate M. S.

Islamic Architecture of the Deccan.

BDCRI, 22, 1.

This is a study of the stylistic evolution of the Islamic architecture erected in the Deccan under the Bahmanis and their successors the Five Sultanates. It shows how from the beginning to the end these structures have adhered to Islamic tectonic concepts, in spite of some stray elements adopted from the indigenous building art.

Balasubrahmanyam M. D.

On the Accentuation of the Vocative, Rtāvṛdhau in RV 1.2.8.

BDCRI, 22, 92.

This paper attempts (1) to examine Haskell's remark that the only exception in the Rig Veda to the general rule for the accent of initial vocatives, is in RV. 1.2.8.; (2) to summarise the arguments of Sāyaṇācārya and Śrīnivāsayajvan for justifying the unaccentedness of ṛtāvṛdhau, in the light of the munitraya-grammatical procedures; (3) to point out the metrical evidence in favour of the unaccentedness of ṛtāvṛdhau; (4) to study the occurrence of the vocative ṛtāvṛdhau in corresponding passages of RV.; and (5) to draw probable conclusions on vocative accentuation.

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Deo S. B.

The potter's technique in Proto-historic Ahar.

BDCRI, 22, 105.

Ahar, a part of Udaipur, in Rajasthan was subjected to relatively larger excavations in 1962-63. The Copper Age remains comprised mostly pottery of various shapes fabrics, decorations and uses. The article explains the different wares, their methods of firing, the nature of clay used, the various methods of decorating the surface of a pot, the possible apparatus used for this and techniques of shaping a pot as adopted by the potters of Ahar in the second millennium B.C.

Gulati A. N.

An early history of flax in India.

BDCRI, 22, 112.

The paper brings to light the use of flax fibre in India in 1500 B.C. It is rather strange that this fibre was not discovered among earlier Indian Archaeological material although linseed has been cultivated in this country for over 2000 years now. It is an exciting find not only because it records the use of flax in India, but also leads one to enquire why the manufacture of flax fibre was abandoned and when ?

Gulati R. K.

Ethnic affinities of Rajputs of Pauri Garhwal (Uttar Pradesh).

BDCRI, 22, 118.

The author has presented in this paper the ethnic composition of the male Rajputs of Pauri Garhwal. These people are a heterogeneous group as indicated by different somatometric and somatoscopic characters. The great range of variation in majority of the somatometric characters, the test of significance and the co-efficient of variation also show that they are a highly mixed people. The probable ethnic strains of which these people are composed are Mediterranean, Mongoloid and Proto-Australoid.

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MALHOTRA K. C.

A Pedigree of Partial Albinism.

BDCRI, 22, 154.

A pedigree of partial albinism has been reported from Dharampur (District Surat). The trait in this pedigree may be due to a recessive gene unlike hitherto reported.

MISHRA V. N. and NAGAR, MALATI.

Two Stone Age Sites on the River Chambal, Rajasthan.

BDCRI, 22, 156.

The Stone Age sites of Kota and Rawatbhata on the Chambal in Kota District were explored by the authors in December 1961. At Kota the existence of two terraces on the Chambal at the heights of about 60 ft. and 30 ft. was observed. The ninety-six implements all collected loose from the river bed, mostly near Kota are divisible into three industrial groups which may be ascribed to three cultural periods, namely Lower Palaeolithic, Middle Palaeolithic and Mesolithic.

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Nautiyal K. P.

An interesting Viṣṇu Image from Baijnath (Almora).

BDCRI, 22, 170.

The description of a composite Viṣṇu icon from Baijnath District Almora in Uttar Pradesh, belonging to the ninth/tenth centuries. The image focusses on the extensive theme of avatāravāda. As it overlooks the Shastric principles and adopts variegated characteristics, an attempt is made here to interpret it in a different manner.

Vale R. N.

Kriyāsamāsas in Marathi.

BDCRI, 22, 175.

'Kriyāsamāsas in Marathi' deals with the history and the analysis of arguments contained in the century old controversy raging among Marathi grammarians over the recognition of verb-compounds as a distinct grammatical category. The author has shown how a blind love for the traditional postulates of Pāṇini which could not keep pace with the march of New Indo-Aryan languages in this respect, is generally responsible for this controversy.

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